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Highway Safety Literature

U.S. Department of Transportation **National Highway Traffic Safety Administration**

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Technical Reference Branch
National Highway Traffic Safety Administration
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GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and catalog or stock number.**

Reference copy only: Documents may be examined at the NHTSA Technical Reference Branch or borrowed on inter-library loan through your local library.

See publication: Articles in journals, papers in proceedings, or chapters in books are found in the publication cited. These publications may be in libraries or purchased from publishers or dealers.

SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Corporate author: Inquiries should be addressed to the organization listed in the individual citation.

ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-026 079

THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS

A laboratory study was carried out to define the effects of luminance, contrast, color, and driver visual characteristics on sign legibility distance. At the same time a computer model was developed which predicts the legibility distance of a sign, based on laboratory data as well as geometric and photometric variables. A field study was then conducted in which legibility distance predicted by the model was compared with legibility distance measured on a number of real and simulated traffic signs, using a sample of normal drivers. In general, the predictions were within 10% of the measured legibility distances. The results indicate that more highly reflective backgrounds permit somewhat greater legibility distances and reduce the effect of changes in viewing conditions, which can be quite substantial for nonreflective backgrounds. The contrast provided by the legend is very important. Luminance contrast requirements are lowest for highly reflective backgrounds and increase as background reflectivity decreases. In this study, the luminance variables have been expressed in terms of material options available to the traffic engineer. If the data are accurate, as they appear to be, this form of presentation enables material choices to be made at a desk, without instrumentation of any kind. Some related problem areas which require study are the effect of glare sources near the sign, and the maximum acceptable background luminance level.

by Paul L. Olson; Arthur Bernstein
Publ: Human Factors v21 n2 p145-60 (Apr 1979)
1979 ; 13refs
Sponsored by National Cooperative Hwy. Res. Prog. Project NCHRP-3-24.
Availability: See publication

HS-026 080

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES

A "same"/"different" reaction time procedure was used in two experiments to measures the times required to comprehend the meanings of projected slides of traffic signs. The results indicate that signs with symbolic messages can be understood more quickly than those with verbal messages. Visually degrading the signs resulted in a greater decrement in performance for verbal than for symbolic signs. correlational analyses demonstrated reaction time to correlate significantly with a previously obtained measure of sign legibility taken from a moving motor vehicle on a roadway. It is suggested that when ever a traffic sign is to be placed at a particular location, the version should be chosen which displays the intended message the most effectively under the expected environmental conditions. If the relative adequacy of the available versions were unknown, it could be assesed by the techniques of the present study; if no testing were to be done, a symbolic sign should be installed. It is recommended that both legibility distance and reaction time measures be taken whenever a complete evaluation of sign adequacy is undertaken. As a cost- and time-saving measure, a laboratory measure of legibility distance is currently under development.

by Jerry G. Ellis; Robert E. Dewar
TC-98541
Publ: Human Factors v21 n2 p161-8 (Apr 1979)
1979 ; 7refs
Sponsored by Transport Canada.
Availability: See publication

HS-026 081

RAILROAD CROSSING SAFETY

Although Amtrak statistics show that no school buses were involved in grade crossing accidents with Amtrak trains during the years 1975 through 1977, and the Dept. of Transportation states that school bus transportation is seven times safer than passenger car transportation in terms of injuries/passenger mile, the railroad train still poses a hazard to school buses. As a reminder to school bus drivers, the procedure for crossing railroad tracks, from the U.S. Instruction Manual, is presented. These guidelines include requesting silence from passengers when prepared to stop; shifting into neutral after the bus is stopped, with bumper clear of tracks and with a clear view of tracks; opening driver's window and service door; shifting into starting gear after it has been determined no train is approaching; looking and listening a second time, then closing door and proceeding quickly and smooothly, without shifting gears; holding the bus in position, with use of parking brake depending on waiting time, if a train is approaching; keeping bus stationary at multi-track crossing until the second track is entirely visible; proceeding if safe crossing is ensured in the case of a stopped train of malfunctioning signal; proceeding around malfunctioning crossing gate only at direction of police or railroad authority; and making a safety stop and following directions of a flagman in control of crossing. The manual emphasizes that no student loading stops should occur within 300 or 400 yd of either side of railroad tracks.

Publ: School Bus Fleet v24 n2 p37-8 (Apr-May 1979)
1979 ; 4refs
Availability: See publication

HS-026 082

TRANSPORT STATISTICS GREAT BRITAIN 1967-1977

A comprehensive range of statistical information is tabulated on inland surface transport in Great Britain covering the period 1967-1977; some data span shorter or longer periods, and some are forecasts. to provide a wider setting for the inland surface transport statistical information, some summary tables on air and sea transport are included as are key transport figures relating to other countries. Metric units are generally used; a notes/definitions section gives detailed explanatory notes appropriate to the tables; a subject index is provided. Tables and maps are presented in the following parts (and sections): general (expenditure, travel, long-distance travel, freight transport); road expenditure and network; road traffic; motor vehicle stock and new registrations; car ownership; public road passenger transport; road goods transport; driving licenses and tests; vehicle tests; railways; accidents; inland waterways; sea transport; air transport; oil and petroleum pipelines; international; and miscellaneous (energy; forecasts of national road traffic, total inland freight, and passenger transport; pollution; employment; overseas travel and tourism; motor vehicle offenses).

Department of Transport, Directorate of Statistics, 2 Marsham St., London SW1P 3EB, England

210p refs
Prepared in cooperation with Scottish Devel. Dept., Welsh Office, and other government departments.
Availability: Her Majesty's Stationery Office 5.75 pounds

HS-026 083

THE SPECTRUM OF SEAT BELT INJURIES

A review is presented of seat belt injury types, the degree of severity ranging from minor contusions and lacerations to rupture and transection of vital structure. Intra-abdominal, genitourinary tract, thoracic, musculoskeletal, and miscellaneous (very uncommon injuries such as those to a major blood vessel) injuries are described; diagrams and texts point out lower trunk (lateral and posterior anterior views) symptoms and possible causes, and abdominal organs and possible injuries. Case histories are presented for two young men who were belted rear-seat occupants at the time their vehicle struck a pillar supporting an elevated railroad. Both men sustained abdominal injuries requiring surgery. A concluding remark advocates the use of restraint systems by all car occupants and calls for the development of better safety systems in the future. Editor's supplementary comments deal with proper adjustment of seat belts (with specific mention of quick-release buckles that pop open under certain conditions). Federal Motor Vehicle Safety Standards for restraint systems, and a physician's comment on the injury potential of restraints.

by Herbert Dardik; Ibraham M. Ibraham
Publ: Lawyer's Medical Journal v6 (2d) n1 p59-75 (May 1977)
1977 ; 55refs
Availability: See publication

HS-026 084

SILICONE BRAKE FLUID: ANSWER TO CORROSION

Silicone-based brake fluids meet brake engineers' requirements (stability for the life of the vehicle, noncorrosivity, a high boiling point unaffected by atmospheric conditions, and the lowest possible viscosity at -40 degree F) and offer the promise of eliminating replacement of hydraulic components for the life of the vehicle. The slight shrinkage of brake system seals associated with unformulated silicone fluids has been overcome through the addition of additives in small amounts. The automotive industry has been justifiably cautious in their approach to silicone-based brake fluids, as current fluids have served adequately. For fleet owners, doubling or tripling the life of wheel or master brake cylinders could result in significant savings. The U.S. Army, Dept. of Transportation, and silicone manufacturers have long been involved in the continual improvement and exhaustive testing of silicone-based formulations. Dow Corning Corp. has tested these brake fluids for over seven years in nearly 200 vehicles (with total mileage approaching 3 million). Testing by the Army of 1/4-ton vehicles for one year in Alaska and two years in Arizona and the Panama Canal Zone showed better performance of silicone vs. conventional brake fluids in terms of corrosion and gumming. As a result of these tests, the Army has issued MIL-*B-46176 covering silicone brake fluids, and is preparing for an across-the-board conversion. The U.S. Postal Service is well on its way to complete conversion. Several private fleet owners are actively testing silicone brake fluids. A General Services Administration decision to convert is contingent upon having the brake fluid available as an option from at least two vehicle manufacturers. The National Hwy. Traffic Safety Administration is funding a feasibility study for a long-life braking system regulation.

Publ: School Bus Fleet v24 n2 p26, 29-30 (Apr-May 1979)
1979 ; 3refs
Availability: See publication

HS-026 085

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT

The 9222 vehicles in the CPIR3 (Collision Performance and injury Report) data set were examined for evidence that would indicate whether tinted windshields cause or prevent accidents. Windshield tint condition was known for 4185 vehicles, showing an almost even split between clear and tinted windshields. Vehicles with tinted windshields were found to be significantly underrepresented in the accident data compared to U.S. production figures (1971-1977 model years). Weighted least-squares regressions showed that the proportion of drivers having vehicles with tinted windshields increases as driver age increases, but that there are no statistically significant differences between daytime and nighttime conditions. The regression analyses results do not support the hypothesis that older drivers are negatively influenced by tinted windshields during nighttime driving. It was found that tinted windshields are associated with a variety of driver and vehicular variables believed to influence accident risk. Because of these uncontrolled, confounding variables, and because of methodological limitations associated directly with the CPIR fole, it is not possible to isolate the influence of windshield tinting in accident causation or prevention. A controlled study is recommended to make such a determination, possible within the National Accident Sampling System.

by Lyle D. Filkins
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-16 ; 1979 ; 53p 4refs
Rept. for Mar-Apr 1979. Sponsored by Libbey-Owens-Ford Co.
Availability: Corporate author

HS-026 086

MEASURING VISIBILITY IN BLOWING SNOW

An electronic system that monitors visibility in blowing snow has been developed by the Forest Service, in cooperation with the Wyoming State Hwy. Dept., to help travelers avoid being standed in blowing snow storms and to improve the safety of transportation under drifting conditions. The sensor for blowing snow is a photoelectric particle counter that produces a voltage pulse for each snow particle particle counter that produces a voltage pulse for each snow particle which passes through a 3 mm by 25 mm area normal to the wind. The sensor's pulse train is processed electronically to give voltages proportional to five-sec averages of particle frequency and diameter. These voltages are combined with the signal from an anemometer in an analog computer which simulates visual range according to the equation, V equals 5U/F(X squared), where V is the visual range in m, U is windspeed in m/sec, F is the particle frequency in number/sec through a 1 sq cm area, and x is the particle diameter in cm. Field calibration was accomplished by a comparison with closed circuit TV recording of visual range targets during drifting. The correspondence between theory and observed visual range was very satisfactory, and two such systems are now in use for traffic control in Wyoming, having proved reliable and useful during three winters.

READEX FICHE

by R.A. Schmidt
Rocky Mountain Forest and Range Experiment Station
Publ: NAS-SR-185, "Snow Removal and Ice Control Research," International Symposium (2nd) Proceedings, Washington, D.C., 1978 p200-7
1978 ; 15refs
Symposium held in Hanover, N.H., 15-19 May 1978. Sponsored in part by Wyoming Hwy. Dept.
Availability: National Acad. of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418

HS-026 087

SYSTEM ANALYSIS OF THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED

A system analysis indentified factors which influence DWI (driving while intoxicated), produced a system model of DWI general deterrence, examined the sensitivity of parameters relative to system outputs such as DWI trip rate and accident rate, and assessed countermeasure approaches. It was found that any significant reduction of DWI trips or related accidents must necessarily be effected through general rather than specific deterrence. DWI general deterrence depends critically upon drivers' perceived risk of DWI trips and on the risk aversion characteristics of potential drinking drivers. relatively small changes in perceived risk of DWI are likely to produce large changes in number of DWI trips/accidents. Word-of-mouth feedback from apprehended or sanctioned drivers is not likely to result in any significant reduction in DWI trips/accidents. Increased enforement reduces DWI trips/accidents significantly only when combined with increased information feedback of the consequences of these actions. The greatest potential for reduced DWI trips/accidents is through widespread dissemination of information emanating from effective and consistent DWI enforcement and adjudication actions. Research recommendations to supply needed information relevant to these conclusions are provided.

by Leland G. Summers; Douglas H. Harris
DOT-HS-6-01456
Publ: Human Factors v21 n2 p205-13 (Apr 1979)
1979 ; 17refs
Availability: See publication

HS-026 088

A PLAGUE ON THESE PESTS [INCONSIDERATE/UNSAFE DRIVERS]

By comparison with other European roadways, it is felt that British roads harbor some strange pests (i.e. irritating drivers); some of these obnoxious (and unsafe) driver types are described. One is the Limpet, or Bumper-Hugger, who sits inches from the bumper of the car he is following, matching the preceding vehicle's speed precisely; besides being offensive, his behavior is dangerous not only in failing to maintain a safe distance between vehicles but also in coercing the other motorist into dirving faster. The Ditherer pays far more attention to the other car occupants than to the traffic; he proceeds in fits and starts and does not use signals. The Road Hog charges into the safe distance between two cars in order to avoid oncoming traffic, and causes other drivers to brake heavily; he also flashes his headlights when he thinks the vehicle in front is holding him up. The Pig in the Middle, the driver who insists on occupying the middle lane at moderate speed, seems to be the pest who causes most trouble. The Litter Bug, the most widespread pest, is the driver or passenger who treats the highway like an unending trash can; he not only desecrates the environment, but also poses a threat to animals and persons on the roadside.

by Colin Dryden
Publ: On the Road v2 n1 p19-21 (Spring 1979)
1979
Availability: See publication

HS-026 090

BIORHYTHMS AND TRAFFIC ACCIDENTS

A critical look at biorhythm theory, in particular its applicability to personal driver safety, is provided. The theory states that there are three fixed cycles in a person's life, each starting at the moment of birth (23-day physical, 28-day emotional, and 33-day mental cycles), and that each person is likely to perform well in the up phases, poorly in the down phases, and to be most vulnerable on the critical day, the midpoint of each cycle. These critical days are claimed to be most likley to be associated with accidents. Most information available about biorhythm theory is found in a book entitled "Is This Your Day?" by George Thommen, containing examples of studies mostly connected with accidents. Lack of convincing evidence for the theory; its shaky origin, being based on a German physician's subjective interpretations of mystical numbers; and the theoretical assumptions involved (that rhythms are invariant and start at the moment of birth) provide good reason for the skepticism that exists among the scientific community. The main advantages of the biorhythm theory seem to be the provision of extra income for an increasing number of entrepeneurs, and the satisfaction of its believers' need for "knowing" the future.

by Lala Mycielska
Publ: On the Road v2 n1 p26-8 (Spring 1979)
1979 ; 3refs
Availability: See publication

HS-026 091

NATIONAL TRENDS IN BICYCLE ACCIDENTS

Two sets of data were collected and analyzed to estimate U.S. trends in bicycle accidents for the period 1973-1976. The first data source is the National Electronic Injury Surveillance System which contains data supplied by a national sample of hospital emergency rooms regarding visits due to product-associated accidents. The second data source comprises reports of 646 in-depth investigations of bicycle associated accidents conducted by theConsumer Product Safety Commission during 1962-1976. It was found that the type of injury and the population injured did not vary substantially over the time period involved. Similarly, the number of bicycle accidents did not increase significantly. With regard to product failure cases, it appears that a voluntary manufacturers' standard (Bicycle Manufacturer's Assoc./6) has reduced the incidence of frame failure; its possible effects should be investigated further.

by J.D. Flora; [illegible]r.d. Abbott
Publ: Journal of Safety Research v11 n1 p20-7 (Spring 1979)
1979 ; 9refs
Sponsored by Bicycle Manufacturers Assoc. of America, Inc.
Availability: See publication

HS-026 092

EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR

To demonstrate the effects of differing amounts of realism, the real-life simulation of head impacts (using a humanoid headform) was compared with a nonrealistic test method (using a rigid metal headform). Impact velocity was the same for both configurations; impact surface was varied in hardness to represent different (football) playing surfaces. The primary readout system was a Severity Index (SI) Analyzer that computed the resultant acceleration and gave a digital readout of the SI and peak acceleration. Using SI criteria, a mathematical relationship was developed for the pass/fail thresholds of the real-life simulation and the test method. Calculations were made on the efficacy of the test method in terms of acceptabel levels of discrimination of unsafe products (i.e. protective headgear such as football helmets), as well as the false alarm rate (rejection of safe products). The evidence suggests that test procedures using metal headforms correlate sufficiently well with real-life simulations using humanoid headforms to permit their use in consumer product safety testing.

by Robert E. Berger; Nicholas J. Calvano
Publ: Journal of Safety Research v11 n1 p14-9 (Spring 1979
1979 ; 14refs
Availability: See publication

HS-026 093

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES

The necessity of establishing a relationship between a proxy measure used to evaluate a safety countermeasure and the ultimate objective of the countermeasure (reduction in accident frequency and severity) is demonstrated. Such a relationship is established for one severity-reduction countermeasure, emergency medical services (EMS), using Alabama accident data. The proxy measure utilized is ambulance response time, which is found to be related to fatality reduction. Additional analyses by time of day, day of the week, and month of the year demonstrate how additional information can be obtained using the proxy measure. Other proxy measures might be sought that, individually or in combination with delay time, could lead to greater insights into more effective EMS resource allocation.

by David B. Brown
Publ: Journal of Safety Research v11 n1 p37-41 (Spring 1979)
1979 ; 6refs
Sponsored by Alabama Office of Hwy. and Traffic Safety.
Availability: See publication
1979 ; refs
Sponsored by American Bar Assoc., Health Resources Administration, and Ford Foundation.
Availability: See publication

HS-026 095

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES

This evaluation of the Dept. of Energy's (DOE) program to develop, demonstrate, and commercialize electric vehicles (EV'S) addresses the potential for EV'S to conserve oil and achieve other environmental objectives, DOE'S implementation of the three major program segments (vehicle demonstration, research and developement,and incentives for small business). Applicable legislation, reports, and planning documents were reviewed, and interviews were conducted with program managers within DOE and other organizations carrying out program responsibilities, officials of other government agencies, and representatives of the automobile and battery industries and EV producers. Although it is concluded that EV'S represent a technology meriting continued development, today's vehicles have limited commercial potential because they cost more and perform less efficiently than conventional vehicles. It is recommended that EV research and development be strengthened, that vehicle demonstrations be limited initially to the Federal sector, and that loan guarantees for commercial production be delayed. The Congress should make the legislative and other changes needed for program redirection. (A letter dated 10 Jan 1978, from DOE to the General Accounting Office, commenting on a draft of this report, is appended.)

by Elmer B. Staats
General Accounting Office, Comptroller General of the United States Washington, D.C. 20548
Rept. No. EMD-79-6 ; 1979 ; 67p refs
Availability: General Accounting Office, Distribution Section, Room 1518, 441 G St., N.W., Washington, D.C. 20548

HS-026 096

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT

Strong electromagnetic (EM) energy sources are examined and estimates made of maximum EM field conditions to which automobiles could be exposed. The results are intended to alert automotive engineers to potentially hazardous EM radiation that might upset on board electronic control devices. The strong EM sources fall into the broad categories of broadcast radiation (AM, FM, TV and Mobile), microwave satellite communication and energy beaming, microwave radar (pulsed fields), high-voltage overhead power transmission line, and transients (radio flash) due to lightning and EMP (electromagnetic pulse) from nuclear explosions. Various expressions relating electric field strength (E) to distance from the source, transmitter power, antenna characteristics, etc., and a few supporting measurements are presented, as well as the maximum E for the automobile environment: For all common failure modes (e.g. thermal overload, burn out, dielectric breakdown, malfunction, bit error, and dropout), the strength E should be a realistic indicator of direct and indirect degradation energies. The conversion of the ambient E field into meaningful currents and voltages at the on-board electronics level has been a major difficulty and more research is needed to assure safe operation and to avoid costly overdesign.

by H.J. Liebe; d.d. Crombie
National Telecommunications and Information Administration, Inst. for Telecommunication Sciences, Boulder, Colo. 80303
Rept. No. NTIA-79-16 ; 1979 ; 34p 22refs
Availability: Corporate author

HS-026 097

DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT

A diesel bus performance computer simulation program provides information on acceleration, velocity, horsepower, distance traveled, and fuel consumption as a function of time from the originating station. Although the program was written for diesel engine operation, heat engines other than diesel may be substituted. Fuel economy calculations using the program agree well with available measurements on urban buses and may be considered representative of a baseline urban bus. Component submodels and vehicle coefficients have been carefully structured to represent current urban buses. A general description of the simulation program, the type of input data required, and results obtained by simulating a typical transit bus are provided.

by Glenn Larson; Harry Zuckerberg
Transportation Systems Center, Cambridge, Mass. 02142
Rept. No. UMTA-MA-06-0044-79-1; DOT-TSC-UMTA-79-16 ;
1979 ; 204p 6refs
Rept. for Mar 1977-Apr 1979.
Availability: NTIS

HS-026 099

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]

Some preliminary results are described of a study being conducted by the Univ. of California, under the sponsorship of the National Hwy. Traffic Safety Administration, which is investigating 899 motorcycle accidents occurring in Los Angeles during the past two and one-half years. More than half of the accidents studied involved riders between the ages of 16 and 23; and although women constitute only 2% of the motorcycling population, they accounted for 3.8% of the accidents in the study. Of the accident victims, 65% were not wearing helmets, 38% stating that they did not expect to have an accident. Over 494 of the accident victims did not have a standard motorcycle license. The average street-riding experience was nearly three years, but more than half the involved motorcyclists had less than five months experience; less than 10% had any formal motorcycle training. The 12% of riders using alcohol or drugs accounted for almost half of the fatalities; an equally small group who had more than four traffic violations in the previous two years represented 24% of the fatalities. In 45% of the accidents, a motor vehicle turned left into the path of a motorcycle, with visibility of the motorcycle a contributing factor. In evasion maneuvers, most motorcyclists tend to overbrake the rear and underbrake the front wheel, have increased reaction time over other motorists, and steer improperly. Misunderstanding of motorcycle dynamics which require an initial steering motion away from the intended direction, plays a large role in the accident victim's inability to react properly. When the rider hits the ground, full leathers are the best means of deceleration. Increased conspicuity (e.g. use of head lights at all times), wearing of helmets, thorough motorcycle training, and improved licensing procedures are advocated.

by Merry MacTavish
Publ: Cycle Guide v13 n6 p64-6, 75 (Jun 1979)
1979 ; 1ref
Availability: See publication

HS-026 100

RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP

The costs of four modes of recreational travel (motor home, car and travel trailer, truck camper, and private automobile/motor hotel) are examined to compare the economics of self-contained recreational vehicle (RV) use vs. lodging and travel by car. Annual fixed (ownership) and daily variable (operating) cost estimates are compared for three RV types; average daily costs of transportation and lodging using a standard car (including a prorated share of ownership costs) are estimated. Estimates are based on results of interviews with RV dealers, repair shop supervisors, service mechanics, actual owners, and or cost figures obtained from insurance executives, banking loan officers, municipal authorities, campground managers, RV manufacturers, and various publications. A critical observation emerging from the analysis challenges the notion that RV owners are somehow "coming out ahead". In order for this to be true, the number of travel days per year would have to exceed the breakeven points of 335, 127, and 86 days, respectively, for the truck camper, the motor home, and the car and travel trailer. Few persons with full-time jobs are able to take that much time off for recreational use. The returns for RV owners must be found in intangibles such as expanded range of vacation opportunities, getting "back to nature", and sociability of fellow travelers. Indications are that the cost of owning and operating self-contained RV'S will continue to rise more rapidly than alternative modes of transportation and lodging. Consideration must also be given to possible stiff taxation on low-mileage vehicles and future gasoline rationing.

by F.B. Green
Publ: Consumers' Research Magazine v62 n5 p16-9 (May 1979)
1979
Availability: See publication

HS-026 101

THE ELECTRICS ARE COMING! [ELECTRIC CARS]

Electric car development is increasing in the U.S., with manufacturers introducing all sorts of new models and stepping up research, and with the Federal government planning to spend $160 million between now and 1986 on electric vehicle (EV) research. General Motors unveiled one of its most advanced electric cars in 1978, the Electrovette (a modified Chevette), is now developing a highly advanced zinc nickel battery for future models, has several electric cars under test; and has just started making electric vans for American Telephone and Telegraph. General Electric (GE) has completed an experimental subcompact the Centennial Edition, with 60-mph and 75-mi-range ability. GE, along with Chrysler, is designing two other models for delivery to the Dept. of Energy (DOE) in 1979. Electric Auto Corp. (Detroit) plans to lease 300 units of its new electric model, the Silver Volt, to Fort Lauderdale, Fla., residents in a test program, and to install a system of quick-charge stations for everyday driving. If the program works, the company will go into production near the end of 1980; Electric Auto also plans to build an electric limousine Cadillac. U.S. Electricar Corp. has unveiled its 'Lectric Leopard which features an easy-to-plug in outlet for recharging. The Long Island Lighting Co. has just installed 40 more electrics in its fleet as a part of a DOE project, and is believed to be one of the world's major operators of electrics on public roads. The National Aeronautics and Space Administration has developed a nickel-zinc battery which offers possible 100-mi range

by Ed Janicki
Publ: California Highway Patrolman v43 n2 p12-4, 44 (Apr 1979)
1979
Availability: See publication

HS-026 102

EUROPEAN BICYCLE SAFETY METHODS. THE WEST GERMAN WAY

The German education system incorporates a "Jugendverke hrsschule" or youth traffic school as a regular part of its fourth grade curriculm. The textbook used is the "die Radfahrpruefung", a bike textbook similar to a driver's manual, which prepares students for a written test on bicycle safety. There is also an instructor devoted exclusively to traffic safety tutoring. The near-zero rate of bicycle accidents among German children within the local area resulted in this system being adopted on a modified basis by the American elementary school at Hahn AFB, in the Hunsrueck area of West Germany. The school has adopted the German bicycle safety course and goals, condensed into a one-month period, and is taught to fifth graders. Receiving instruction from a member of the AFB'S Security Police Squadron, students are first introduced to the parts of a bicycle and required safety features. The initial theoretical portion of the course is presented, including a section on traffic laws and German traffic films, and a 40-point written test administered. Regardless of his test score, each student advances to the driving or practical portion of the program, taught by a German police officer who is an expert in traffic safety. Four separate traffic situations are taught, each on a different day, in a safe, school environment. In order to receive a passing grade, each student must complete the four exercises with a maximum of five mistakes. Students who complete the course receive a certificate and safety sticker for their bicycle. For the American school system as well as for German students, a near-zero bicycle accident rate indicates the success of the safety program.

by Paul K. Kahl, Sr.
Publ: California Highway Patrolman v43 n2 p16-7, 53 (Apr 1979)
1979
Availability: See publication

HS-026 103

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)

As part of a research project to develop appropriate rehabilitation measures for problem drivers in Austria, the theoretical foundation behind driver improvement, and international experience with driver rehabilitation are examined. Driver improvement measures as an extension of driver screening, and the provisions of Section 101 of Austria's Highway Code regarding driver competency are considered. Driving behavior as a learned behavior is analyzed; the role of feedback and reinforcement on behavior, types of behavior-regulating feedback to drivers (driving instruction, criticism by other drivers, punitive action by authorities for traffic violations, accidents and near accidents); and the effect of negative reinforcers (i.e. accidents and violations) on driving behavior are treated. The detection of problem drivers is discussed in terms of the relationship between a driver's traffic record and accident involvement, and the point systems (for traffic violations) in West Germany and the U.S. A summary of driver improvement measures, a comparison of different driver improvement group courses in the U.S., and an outline of driver improvement initiatives in German-speaking countries are provided. A critical evaluation is made of existing group programs for driver improvement, and the applicability of various forms of therapy to driver improvement is analyzed. A model plan is presented for the detection and rehabilitation of problem drivers in Austria.

by L. Schmidt; A. Schutzenhofer
Publ: Zeitschrift fur Verkehrsrecht v22 n8 p250-5, n9 p279-88, n10 p312-7 (1977)
1977 ; 65p 68refs
Translated from German reprint (original 22p; translation 43p). Research sponsored by Federal Ministry of Science and Res. (austria), Federal Ministry of Youth Welfare (Austria), and Jubilee Fund of the Austrian National Bank.
Availability: Reference copy only

HS-026 104

MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS

Helmet use by motorcyclists was observed in late 1978 in cities of six states with varying legal requirements regarding helmet use. In two cities (Baltimore and Miami), in which all motorcyclists are legally required to wear helmets, virtually all riders wore helmets. In three cities (New Orleans, Phoenix, and Houston) where helmet laws requiring use by all motorcyclists were changed in 1976 or 1977 so that use is mandatory only for those persons under the age of 18, wearing rates were 39%, 46%, and 63%, respectively. In Los Angeles, which has never had a mandatory helmet use law, 46% of motorcyclists wore helmets. Based on these survey results, and on the known efficacy of helmets in reducing motorcyclist injuries, the repeal of helmet laws that occurred in 26 states in 1976-1978 can be expected to result in major increases in motorcyclist deaths in succeeding years.

by Allan F. Williams; Marvin J. Ginsburg; Phyllis F. Burchman
Insurance Inst. for Hwy. Safety, Watergate 600, Washington, D.C. 20037
1979 ; 9p 9refs
Availability: Corporate author

HS-026 105

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]

The basic principle of each front wheel alignment factor and the working relationship among these factors are explained for the wheel alignment specialist, including some inspection and adjustment tips. The following basic factors are discussed and illustrated: caster (forward or rearward tilt of the ball joints from a vertical line when viewing vehicle from the side), camber (inward or outward tilt of the front wheel from a vertical line when viewing vehicle from the front), toe-in (difference in distance between front and rear edges of front tires when viewed from topside of vehicle), toe-out on turns (degree difference in turning angle of two front wheels), king pin inclination (a locating of the ball joints so that they are "offset" from the vertical when viewed from the front of vehicle), and included angle (king pin inclination and camber together). Camber (and side to-side difference), caster (and side-to-side difference), and toe-in specifications are provided for the purposes of diagnosis for warranty repairs or customer paid service, periodic motor vehicle inspection, and resetting alignment. It is pointed out that of all front wheel alignment factors, toe or toe-in is probably the most important because of its immediate effect on tire wear. The importance is emphasized of checking a vehicle's riding height before checking or adjusting alignment, and making caster/camber adjustments only when necessary.

by Herb Carrier
Publ: Tire Review v79 n4 p52, 54, 56-8 (Apr 1979)
1979
Availability: See publication

HS-026 106

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS

The National Safety Council's (NSC) 15-hour bicycle safety instructor seminars prepare individuals to teach not only the NSC All About Bikes Prog. (a comprehensive, six-hour course to give children the framework for wise bicycling), but also the 4-H Club and Club Scout bicycle training courses. The instruction is usually given on two days, broken down into four phases: a five-hour, classroom session in which the All About Bikes Instructor Manual is used as the basic text, supplemented by 4-H and Cub Scout Leaders guides; a two-hour session on bicycle maintenance and repair; a two-hour practice of the Skilled Driving Contest in which the instructor trainees actually practice the maneuvers they will teach their students; and a four hour session during which each of the student instructors takes turns teaching for from three to ten minutes. The eight skilled driving exercises cover balance ability, speed and slow speed coordination, decreasing space maneuvering, decreasing serpentine balance and steering, right or left evasion, and left and right spiraling. The final two hours are devoted to a "rap session", after which certificates of completion are presented. An important factor in the bicycle instructor seminar program is the inherent multiplying effect. In the fall of 1978, the NSC Youth Dept. sent questionnaires to 405 graduates (about half the total). Of the 61 who responded, more than 90% said that the instruction was sufficient to make them feel competent about teaching bicycle safety; each respondent was found to have taught, on the average, almost seven classes (215 per class). So far, 143 graduates of the seminar program have become certified instructor trainers. The seminars are organized by a "local catalyst" (e.g. safety council, police department, service club, PTA) who contacts the NSC'S Youth Dept. The basic fee is $13.50 per student; each class should have 25 to 50 students; equipment needed is a movie projector and at least three bicycles.

by Robert B. Overend
Publ: Traffic Safety v79 n4 p8-10, 28-9 (Apr 1979)
1979 ; 1ref
Availability: See publication

HS-026 107

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"

In 1978, the Minnesota Safety Council, the Minnesota Dept. of Public Safety, and the Minnesota Energy Agency, initiated a public education campaign on the 55 mph speed limit, with a theme of "Real Pros Drive 55...Saves Gas! Saves Lives!". Three 30-sec TV spots were produced featuring champion professional racing drivers, and three more spots with national champion professional over-the-road truck drivers (provided by a cosponsor, the Minnesota Motor Transport Assoc.) which conducted a parallel campaign supplying literature and bumper stickers to its members, and forms to citizens for reporting speeding truckers). The highlight of the "Real Pros" campaign was in Jan 1979, when "The Minnesota Challenge" was broadcast throughout the state (estimated 120 million viewers), a half-hour energy-saving driving quiz program based on a Honeywell-produced film entitled "Featherfoot". Newspapers, magazines, and company publications published the program announcement and a quiz form and TV spots announced availability of forms; quiz forms were distributed to high school students as part of a home study assignment. Based on a major 1977 campaign on the 55 mph speed limit, billboard use was increased to 100 locations. The campaign slogan was used at public facilities and events. Eight prints of the "Featherfoot" were in constant circulation. An attitude questionnaire published in newspapers received a 50.58% extremely favorable response and 31.79% somewhat favorable response to the 55 mph speed limit; 48.41% responded that speeding was extremely important, and 30.79% stated that it was very important, in causing crashes; 72.11% believed that driving 55 mph saved gas, and 76.38% believed that it saved lives; but the majority believed that most people drove between 60 mph and 65 mph. Speed statistics for 1978 show that the "Real Pros" campaign assisted in holding speeds to a lower level than they had been in all years prior to 1977; but crashes and fatalities increased in 1978.

by Robert L. Anderson
Publ: Traffic Safety v79 n4 p14-5, 30 (Apr 1979)
1979
Availability: See publication

HS-026 108

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?

Dr. Patricia Waller, associate director for driver studies at the Univ. of North Carolina's Hwy. Safety Res. Center, proposes a low-cost, collaborative effort between driver licensing and public health agencies. The effort would involve using driver license programs to screen persons for the detection of certain health problems shown to be associated with poor driving (e.g. hypertension, diabetes), to refer those driver license applicants with problems to medical experts, and to follow-up the licensed drivers automatically every four years through renewal license procedures. The driver-related decisions would remain with the licensing authorities, while health and social service decisions would be made by appropriate professionals. The incorporation of such a screening program could be justified on licensing grounds; the relationship between hypertension and driving, for example, may prove to be more direct than that between vision and driving. (Vision screening is already a part of evaluation procedure for original licensure.) Departments of motor vehicles could also work cooperatively with state health professionals to control the problem driver. Health professionals and social services experts should play a major role in providing driver improvement analysts or state hearing officers (who frequently represent the first official personal contact with the department of motor vehicles for problem drivers) with information on community resources which could be used as additional alternatives to traditional driver improvement measures.

Publ: Traffic Safety v79 n4 p18-20, 30-1 (Apr 1979)
1979
Reprinted from a recent issue of Highway Safety Highlights (published by Univ. of North Carolina, Hwy. Safety Res. Center)
Availability: See publication

HS-026 109

ACCIDENT INVESTIGATION--WHO CHECKS THE SHOCK ABSORBERS

Statistics accumulated over several years through independent tests and those from car clinics carried out by the European Shock Absorber Manufacture's Assoc. (EuSAMA) have shown that about one in three cars of testable age have one or more shock absorbers in a dangerous state of repair. Shock absorber wear is caused by outer-tube corrosion, damage by debris thrown up from the road, internal valve fatigue, and especially by deterioration of the oil seal resulting in hydraulic fluid loss. The wear and failure ratio is 60% on front axle, 40% on rear. EuSAMA classifies shock absorbers as dangerous when they are operating at 40% below original equipment figures. Shock absorber danger signs include hydraulic fluid on outside of absorber, loose absorbers, damaged end rubbers, badly corroded units, and bent piston rods (following accident damage). Worn shock absorbers affect headlight alignment, braking distance, and tire adhesion, in addition to ride and handling. Additional vibrations caused by worn shocks can cause car sickness and driver fatigue, can shake loose electrical components, wear tires unevenly, and wear out universal and drive joints and steering components more quickly. A suggested checklist for use by police at roadside safety checks includes observing the vehicle in motion (bouncing, lopsided attitude, headlight misalignment), bouncing the four corners of the car (check oscillations), and checking underneath vehicle for danger signs. The inclusion of shock absorbers in the Ministry of Transport Test in the U.K. in 1977 will do a great deal to eliminate worst cases, and has already resulted in increased shock absorber sales.

by John Wardle
Publ: Journal of the Institute of Automotive Engineer Assessors v13 p4-7 (Winter 1977-1978)
1978
Availability: See publication

HS-026 110

CAR REAR IMPACTS AND THE NEED FOR HEAD-REST

An analysis by the Transport and Road Res. lab., (TRRL, England) of 1971 road accident data for Great Britain showed that 5.5% (153) of fatal and 7.2% (2652) of serious car occupant casualties involved cars damaged in the rear. Of these casualties, almost 20% were rear-seat occupants who, according to other studies, had little need of headrests; over half of those injured in front seats were asymmetrically impacted from the rear, and narrow headrests might not have protected them. In 21 serious or fatal injury accidents investigated by TRRL which involved cars or vans struck in the rear, 7 out of 41 occupants suffered whiplash injuries, representing less than a quarter of front-seat occupants. A study by the Southern and Midlands Road Safety Units in 1969 found that 80 neck injuries occurred in 117 less serious rear-impact accidents. It is estimated that about 3% of all car occupants involved in rear impacts to their cars will suffer slight neck injuries (5% of all slight injuries) resulting in somewhat greater economic loss than for other slight injuries. Whiplash injuries from rear impact are thought to be somewhat greater than 5% of slight injuries. Detailed studies by TRRL have shown that whip lash injury does not correlate with extent of damage from rear impact. Whiplash injuries are caused by hyperextension of the neck, and are more likely to be serious for older people. Most experts consider headrests, high seat backs, etc., as means of preventing such injuries. A cost/benefit analysis suggests that the fitting of two extended seatbacks or headrests would have to cost 1 pound to equal benefits.

Publ: Journal of the Institute of Automotive Engineer Assessors v13 p8-9 (Winter 1977-1978)
1978
Availability: See publication

HS-026 111

SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT

Research focused on five major areas of high-occupancy vehicle (HOV) priority treatment projects: an examination of the pertinent accident rates, an analysis of causative factors influencing safety, an identification of difficult maneuvers and potential safety problems, the development of recommendations to improve safety, and a review of the legal authority and legal liability issues faced by HOV projects. Twenty-two HOV projects on 16 highway facilities were visited: Shirley Hwy., Fairfax Co., Va.; San Bernadino Freeway, Los Angeles; Moanalua Freeway, Honolulu; Santa Monica Freeway, Los Angeles; Route 101, Marin Co., Calif.; I-95, Miami; I-495, approach to Lincoln Tunnel, Hudson Co., N.J.; Long Island Expressway, New York City; ramp metering bypass ramps, Los Angeles; I-5, Seattle; San Francisco-Oakland Bay Bridge Toll Plaza, Oakland; Washington, D.C. central business district streets; U.S. 1/South Dixie Hwy., Miami; Kalanianaole Hwy., Honolulu; N.W. 7th Ave., Miami; and Ponce de Leon/Fernandez Juncos Avenues, San Juan, Puerto Rico. These projects encompass every type of preferential treatment strategy currently employed in the U.S. on both freeways and arterial facilities. For each HOV project, data on safety, operations, and geometrics were collected and analyzed. These data and qualitative information can be used to describe the current experience relating to the HOV safety issue.

by Craig Miller; Robert Deuser; Joseph Wattleworth; Charles Wallace
Beiswenger, Hoch and Associates, P.O. Box 600028, North Miami Beach, Fla. 33160; University of Florida, Transportation Res. Center
DOT-FH-11-9182
Rept. No. FHWA-RD-79-59 ; 1979 ; 194p refs
Rept. for Oct 1976-Dec 1978.
Availability: NTIS

HS-026 112

ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT

Guidelines are presented for assessing the potential for adverse environmental impact resulting from seismic vibrations induced by highway traffic. Vehicle/pavement interaction, propagation of vibration, response of building structures, and evaluation criteria are presented in quantitative engineering terms. Abatement strategies, measurement, and analysis of traffic-induced vibration are discussed. Example problems and analyses are presented for pavement surface roughness, vehicle speed, and vehicle gross weight, the main parameters in traffic induced vibration. The details upon which the guidelines are based are found in a parent report, FHWA-RD-78-168, "Determination of Impact from Vibrations Related to Highway Use," which documents a study to define the nature and extent of traffic-induced problems.

by F.F. Rudder, Jr.
Science Applications, Inc., Energy and Environmental Sciences Div., 1651 Old Meadow Rd., Room 620, McLean, Va. 22101
DOT-FH-11-8494
Rept. No. FHWA-RD-78-166; 5-451-00-288-00 ; 1978 ; 146p 38refs
Rept. for Jun 1974-Jun 1977.
Availability: NTIS

HS-026 113

THE SURFACE TRANSPORTATION, ASSISTANCE ACT OF 1978

The Surface Transportation Assistance Act of 1978 (P.L. 95-599), signed into law on 6 Nov 1978, is the first act to combine authorizations for highways, highway safety, and public transportation in one piece of legislation, and the first act related to Federal-aid highways to authorize funds for a four-year period. Total funding provided in the act is $51.4 billion to become available in fiscal years 1979 through 1982, with $30.6 billion for highways, $7.2 billion for highway safety, and $13.6 billion for public transportation. The most significant provisions include extension of the Hwy. Trust Fund as the major source for highway and highway safety program funding for five years (30 Sep 1979 to 30 Sep 1984), as well as extension of existing taxes; stimulation of accelerated completion of the Interstate System; promotion of more effective safety and bridge programs; restructuring and refocusing of transit assistance; and program changes to promote greater flexibility.

Departament of Transportation, Washington, D.C. 20590
1978? ; 46p
Availability: Federal Hwy. Administration, Office of Public Affairs, 400 7th St., S.W., Washington, D.C. 20590; Urban Mass Transportation Administration, Office of Public Affairs, 400 7th St., S.W., Washington, D.C. 20590

HS-026 114

FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS

The major components unique to light-truck four-wheel drive (4x4) systems and their effect on vehicle performance are reviewed. The tractive capabilities of four-wheel drive are compared with front and rear driver under various load, grade, and friction conditions. The effects of different types of inter-axle differentials are examined, and the advantages and disadvantages of various front suspension and drive systems for 4x4's discussed. Although significant technological advances have been made in the development of 4x4 systems, numerous aspects of current systems, such as ride, handling, cost, ease of operation, and fuel efficiency, compare unfavorably with their two-wheel drive counterparts.

by Martin J. Hermanns
Dana Corp., Spicer Front Drive Systems Div.
Rept. No. SAE-SP-437 ; 1979 ; 23p 11refs
Presented as 25th L. Ray Buckendale Lecture.
Availability: SAE

HS-026 116

AUTOMOTIVE SAFETY--THE NEED TO KNOW

It is emphasized that the consumer needs to be aware of present automotive safety standards and statistics in order to select a vehicle and equipment that will provide the greatest safety to him and his passengers. The greatest difference among vehicles in terms of occupant protection is related to vehicle size and weight. Statistics show a 3-to-1 ratio of death or serious injury to occupants of small cars over those of large cars; one study found that serious injury occurred twice as often when a small (compact) car collided with a small car as when a large car collided with a large car. It is questioned whether the fuel-saving 800 lb and 1000 lb weight reductions of new cars will offset the more sophisticated design for improved structural integrity and adversely affect the protectiveness of even the bigger cars. The consumer should be informed of the protection, comfort, and convenience afforded by the various restraint systems. The appeal of passive restraint systems is noted; because of their automatic operation, they eliminate many consumer information problems and require limited consumer cooperation. It is emphasized that these systems require honest, straightforward presentation and promotion, including mention of their disadvantages (e.g. initial and replacement cost of air bags, and force of blast on deployment). The need for more highway crash data on the effectiveness of air bags and passive belt systems is emphasized. The failure of Federal Motor Vehicle Safety Standard 121 (antilock brake systems for trucks and buses) because of inadequate evaluation in actual trucking service is cited, emphasizing the need for the consumer to insist that regulatory proposals remain proposals until field trials have been conducted. Automotive safety and safety regulation information on a much wider scale needs to be published to aid the consumer.

by Roy C. Haeusler
Rept. No. SAE-SP-435 ; 1978 ; 9p
Ralph H. Isbrandt Memorial Lecture.
Availability: SAE

HS-026 117

PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS

Field performance of flux-brazed aluminum automobile radiators removed from cars after service periods as long as ten years show aluminum to be a viable construction material. Data representing service experience dating back to the early 1950's indicate that properly designed radiators, adequately cleaned to remove brazing flux, offer a high degree of structural integrity. Extended, trouble-free service can be expected when cooling systems are maintained and the coolants added according to manufacturers' recommendations. With increasing usage of road salt during winter months, significant external corrosion of thin-wall tubes has been observed, but improved protective systems, now available or being developed, will substantially minimize the corrosion problem. Field experience with repair systems is limited, but laboratory tests indicate the availability of adhesive systems that should be adequate for repairing damaged radiators. Protective coatings are recommended for both metallic (lead tin) and adhesive (epoxy) repaired areas.

by William King; w.c. Weltman
Alcoa Labs.
Rept. No. SAE-790400 ; 1979 ; 8p 2refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 118

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE

Test data show that the performance of a new two-cycle additive (Additive A) is at least equivalent to the current Boating Industry Associations (BIA) TC-*W Reference Oil in water-cooled outboard engines operating on a variety of leaded fuels under a wide range of test conditions. Air-cooled engine performance was superior to the TC-*W Reference Oil in high-temperature ring sticking, and exhaust-port blocking, and the new additive system appeared to be effective in preventing piston scuffing during BIA TC-*W Phase 1 conditions. Additive A can be used to formulate TC-*W oils containing no bright stock. Limited lead-free fuel testing showed similar cleanliness and performance of Additive A. In certain high-output engines operating at 65:1 fuel-air ratio, it was found necessary to add 12% bright stock to the formulations to prevent piston scuffing and bearing wear. At 50:1 or less fuel-air ratios, no bright stock is required. The evaluation resulted in extensive test development using a large variety of two-cycle engines; this was necessitated by the lack of standardized certification procedures for air cooled, two-cycle lubricants. The BIA'S TC-*W test, although adequate to evaluate two-cycle oil performance in large-output outboard engines, cannot be expected to evaluate lubricants satisfying all engine types and operating conditions. Current efforts by the Society of Automotive Engineers, and the American Society for Testing and Materials to establish a meaningful two-cycle engine oil classification system are endorsed.

by D.L. Clason; w.m. Nahumck
Lubrizol Corp., Res. Dept.
Rept. No. SAE-790080 ; 1979 ; 15p 6refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 119

SAFETY OF MULTIPURPOSE VANS. SPECIAL STUDY

An investigation of 18 low-to-moderate speed crashes involving multipurpose vans was undertaken in order to determine injurious effects on occupants of custom interior furnishings and structural modifications, because certain existing Federal Motor Vehicle Safety Standards (FMVSS'S) do not apply to vans. The safety of vans was evaluated from the standpoints of injury-producing environment, occupant restraint, crashworthiness, postcrash fire, and ease or difficulty of escape. FMVSS'S 201, 202, 203, 204, 212, 214, 215, and 216 were evaluated in terms of these five main area of investigation. Inadequately secured or unsecured appliances, seats, and furnishings were found to have contributed to serious injuries and deaths. Securement of appliances and furnishings by wood screws, nails, or other fastenings is often inadequate to retain equipment in place during an accident. Custom highback bucket seats ("captain's type) failed in three cases and caused occupant injuries. Custom steering wheels caused injuries to several drivers and probably one driver death; some drivers were injured when they hit production steering wheels/columns. It is not clear that FMVSS'S 203 and 204 can be directly extended to vans. Restraint systems were not available or not used, partially accounting for a high number of ejections and severe-to-fatal injuries. Ten out of 19 vans did not retain their windshields on impact, resulting in five occupant ejections; FMVSS 212 applies only to forward-control vans. In five accidents, a van overrode a passenger car, resulting in four car occupant fatalities. Twenty percent of the doors jammed, not resulting in escape problems but posing a potential hazard. In six van models, not required to meet FMVSS 206, 17 doors opened at impact, while only two doors meeting the standard opened. No evidence was found of excessive passenger compartment compression, nor of adverse effects by custom windows on crashworthiness. Neither was there evidence that injury reducing features of FMVSS 201 (Interior Impact) would not have been effective in minimizing injury.

National Transportation Safety Board, Bureau of Plans and Programs, Washington, D.C. 20594
Rept. No. NTSB-HSS-79-1 ; 1979 ; 47p 7refs
Availability: NTIS

HS-026 120

CHILDREN IN CRASHES: A SPECIAL ISSUE

Several current activities are reported involving hazards to children in motor vehicle especially, hazards to unrestrained children. The National Hwy. Traffic Safety Administration (NHTSA) regional workshops on child restraints are described; the first of these is planned for Atlanta in Mar 1979; the objective is to marshall grassroots support for increased protection for children in cars. Mention is made of NHTSA rules, to be issued in the summer of 1979, that will require dynamic crash testing of child restraints at speeds up to 30 mph, using specified test dummies. Although only one state now has a child restraint law in force (Tennessee), it is reported that proposed bills for such legislation have already been introduced in 11 states in 1979 and are expected to be filed in at least seven more states. A response by the Insurance Inst. for Hwy. Safety (IIHS) to an inquiry from a state motor vehicle administrator recommends necessary elements of an effective child restraint use law, and provides information on children in crashes. A cited study by the Univ. of Michigan's Hwy. Safety Res. Inst. (HSRI) found that many of currently used restraint systems for protecting handicapped children in school bus collisions are inadequate. A research project supported by IIHS demonstrated the inability of adults to restrain children adequately in their laps by holding on to them. Mention is made of a Dept. of Transportation order to review flammability standards for school bus interior materials. An IIHS-SUPPORTED study conducted by Johns Hopkins Univ. found that infants as motor vehicle occupants have an extremely high death rate compared to older children. The ineffectiveness of an Australian child restraint publicity campaign is reported. A letter to NHTSA from the IIHS concerns Renault's misinterpretation of Head Injury Criterion data from a free-fall study conducted by HSRI under IIHS sponsorship.

by Margaret Heckard; John Reichard; Rea Tyler; John Walker
Publ: Status Report v14 n5 p1-16 (19 Mar 1979)
1979 ; refs
Includes HS-026 121.
Availability: See publication

HS-026 121

UNSAFE AT ANY AGE? CHILDREN AND CAR SAFETY

Facts are reported about child involvement in motor vehicle crashes, with special emphasis on the importance of properly using appropriate child restraint systems. Various studies are cited which have demonstrated the effectiveness of child restraints in reducing injuries and fatalities in motor vehicle crashes, the number one cause of death for children over the age of one. Various statistics indicate the infrequent, and generally incorrect, usage of child restraint systems. It is recommended that in the absence of a child restraint device, small children should be made to use regular lap seat belts with the seat belt across the top of the child's thighs. Older children should use both lap and shoulder straps. The safest location is in the middle of the back seat. While an adult seat belt restraint is better than none, the first and best choice for a small child is an approved child restraint because it is designed to meet his special needs in a crash. Four types of child restraints include an infant carrier, a protective shield, a traditional car seat, and a safety harness. The Tennessee mandatory child restraint usage law exempts older children and allows parents to hold their children, a dangerous practice. The National Hwy. Traffic Safety Administration's proposed new testing and performance requirements for child restraints, and its regional child restraint workshops are mentioned. A "no excuses" safety guide for parents, and statistics from NHTSA'S Fatal Accident Reporting System on characteristics of accidents involving child fatalities, are outlined in separate sections.

by Stewart Alter
Publ: HS-026 120, Status Report v14 n5 p8-12 (19 Mar 1979)
1979 ; 1ref
Reprinted from Parents Magazine (Feb 1979).
Availability: See publication

HS-026 285

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]

An automatic transmission fluid (ATF) has been developed which can meet the needs of transmissions designed for either friction-modified or nonfriction-modified fluids. Approved under General Motors' DEXRON-II and Ford's M2C138-CJ specifications, it also meets the requirements of Ford's M2C33-F (Type F) specification except for the friction modifier content. The DEXRON-II/CJ fluid did not show any signs of clutch plate damage or band slippage when tested in transmissions designed for Type F fluid. The tests included severe, 8000-cycle vehicle and dynamometer tests and special vehicle dynamometer tests run by Ford. In actual field practice, DEXRON-II fluids are being added to transmissions designed for Type F ATF. Conversely, Type F fluids are being added to transmissions designed for DEXRON and DEXRON-II is superior to that of Type F ATF. As measured by the Turbo Hydramatic Cycling Test, the oxidation stability of Type F fluids ranges from nearly equivalent to significantly poorer than DEXRON-II requirements. It is believed that a specification designed around the DEXRON-II specification can be developed to describe a service station ATF that will be suitable for automative automatc transmissions which now require DEXRON, DEXRON-II, Type A Suffix A, or Type F ATF. Test results are appended.

by H.E. Deen; R. O'Halloran; ●e.f. Outten; ●j.p. Szykowski
Exxon Chemical Co.
Rept. No. SAE-790019 ; 1979 ; 16p 11refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 286

AUTOMOTIVE TECHNOLOGY PROJECTIONS

Results of an automotive technology assessment study are presented to provide a basis of comparison for vehicles with alternative power systems. The following engine types are examined: Otto (uniform-charge (UC), rotary UC, stratified-charge (SC), rotary SC), diesel (naturally-aspirated, turbocharged), free-turbine Brayton (metal, ceramic), single-shaft Brayton (metal, ceramic), and Stirling (metal, ceramic). Factors considered include fuel economy, exhaust emissions, multifuel capability, advanced materials, and cost/manufacturability for both convention and advanced alternative power systems. to ensure valid comparisons of vehicles with alternative power systems, the concept of an Otto-Engine-Equivalent (OEE) vehicle is utilized. Each engine type sized to provide equivalent vehicle performance. Fuel economy projections are made for each engine type considering both the legislated emission standards (0.4 g/mi hydrocarbons, 3.4 g/mi carbon monoxide, 1.0 g/m nitrogen oxides (NOX)) and possible future emissions requirements (0.4 g/mi NOX). The sensitivities of the fuel economy projections to factors such as engine torque boundary, rear axle ratio, performance criteria, and engine transient response are discussed Using the OEE vehicle concept, projected fuel economies of both small- and full-size vehicles with Stirling engines are up to 40% better than baseline vehicles with conventional engines. Vehicles with Brayton engines show up to a 30% better fuel economy than the baseline in full-sized vehicles, but offer little fuel economy advantage in small vehicles. Advanced continuous combustion power systems (Brayton and Stirling) offer advantages over the baseline vehicles in the areas of exhaust emissions and multifuel capability, but their initial costs are projected to be substantially higher.

by M. Dowdy; A. Burke
California Inst. of Tech., Jet Propulsion Lab., Pasadena, Calif.
Rept. No. SAE-790021 ; 1979 ; 20p 46refs
Technical Paper Series. Presented at Congress and Exposition; Detroit, 26 Feb-2 Mar 1979. Research sponsored by Dept. of Energy.
Availability: SAE

HS-026 287

SMALL CAR SAFETY IN BIG-CAR COUNTRY

The safety aspects of roadside appurtenances which have been developed during the past ten years are reviewed, as well as those of systems currently under development and test. These systems, developed through research sponsored by the Federal Hwy. Administration, the states, and the private sector, are basically fail-safe systems designed to reduce fatalities, personal injury, and property damage in low- and high-speed impacts by either small or large-size passenger cars. The following categories of roadside appurtenances are covered (photographs of the fail-safe systems provided): luminaire supports, utility poles, roadside sign supports, overhead sign bridge structures, protective median barriers, impact attenuators at exit ramps, forgiving bridge rails, construction zone safety devices, railroad/highway grade-crossing environment improvements and impact attenuators, and tollgate facility impact attenuators.

by F.J. Tamanini
Energy Absorption Systems, Inc.
Rept. No. SAE-790294 ; 1979 ; 21p refs
Prepared for presentation at Congress and Exposition, Detroit, 1 Mar 1979.
Availability: SAE

HS-026 288

EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES

Results are presented and discussed from a laboratory study undertaken to clarify how various tire conditions, such as internal pressure, load, make, width, tread pattern, and tread curvature, and the drum curvature of the testing machine, influence the dynamic properties of motorcycle tires. The importance of tire dynamic properties in predicting the dynamic properties of motorcycles, and the indispensability of the control of tire dynamic properties for the improvement of motorcycle performance are considered. It was found that tire dynamic properties (cornering stiffness, camber stiffness, side force (camber thrust), overturning moment, self-aligning torque) are significantly influenced by the various tire and drum factors. It is hoped that the beneficial data obtained may contribute to future improvement in motorcycle dynamic properties as well as in tire dynamic properties.

by Hideo Sakai; Osamu Kanaya; Hiromi Iijima
Japan Automobile Res. Inst., Inc., Japan
Rept. No. SAE-790259 ; 1979 ; 16p 2refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 289

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES

A comparison of moped and motorcycle design features related to directional handling is presented. Design parameter values are given for four sample mopeds (typical moped, moped with the appearance of a small motorcycle, moped with swing-arm front suspension, and moped with front-wheel drive (fork-mounted motor)), in comparison to those of a lighweight street motorcycle. Analytical results describing the sample mopeds' lateral-directional dynamics are provided. Using a nominal moped example, the sensitivity of the vehicle dynamics to operational and design variables, such as speed, loading, and tire properties, is shown. Implications for rider/moped handling are reviewed. Comparison of the four example mopeds with a lightweight motorcycle and other street machines shows that the mopeds generally have response modes similar to motorcycles, but that mopeds can be twice as sensitive to roll-to-steer torque gains at nominal operating speeds, requiring more precise control and attention, and reduced inadvertant control activity. Factors are outlined which reduce moped stability in the capsize, weave, and wobble modes.

by John W. Zellner; David H. Weir
Systems Technology, Inc., Hawthorne, Calif.
DOT-HS-7-01719
Rept. No. SAE-790260 ; 1979 ; 16p 9refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 290

SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS

Previous work on vehicle ride dynamics applicable to motorcycles is reviewed, and the basis discussed for a four-degree-of-freedom (bounce, pitch, and movement of each wheel) computer simulation of the dynamic ride response of a motorcycle. The simulation is nonlinear in terms of both geometry and suspension components, and is generally applicable to any type of motorcycle of reasonably standard configuration. It was developed in the context of application to off-road motorcycles, and special problems associated with simulating these machines are discussed. Some numerical results are presented which indicate that the dynamic response is strongly nonlinear, with wheel lift-off and suspension bump stops as the two major sources of nonlinearity. Considering the general behavior of the stock vehicle utilized (a 1974 Kawasaki KX250 typical motor-crosser), it was found that instead of two separate bounce and pitch natural frequencies, one general resonance at around 5 cps occurred, indicative of the strong coupling between bounce and pitch for this vehicle. The accelerations at 5 cps were much stronger for the out-of-phase sinusoid than for the in-phase case, suggesting that a pitching motion (arising from out-of-phase case) is more uncomfortable for the rider. Recommendations are offered for improving the simulation.

by Stephen H. Black; Dean L. Taylor
General Electric Co., Schenectady, N.Y.; Cornell Univ., Ithaca, N.Y.
Rept. No. SAE-790261 ; 1979 ; 16p 20refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 291

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'

Three male subjects participated in experiments in which an eye-marker method was used to compare motorcyclists' vs. drivers' visual scanning behavior. Independent variables were vehicle type and speed. The proportion of road surface in the visual field was found to be much larger for the motorcyclist than the driver of the car. Since the motorcyclist's head is tilted forward, it follows that he is apt to be looking at the near road surface more frequently. From an analysis of motorcyclist and driver fixation points, it is suggested that the motorcyclist is acquiring information mainly from the near road surface, whereas the car driver is acquiring information mainly from the distant foreground. For motorcyclists, the vertical variance of visual field and fixation points is larger, suggesting that the motorcyclist is trying to acquire information from both the near road surface and the distant foreground. Mean fixation duration of the motorcyclist is shorter than that of the car driver, suggesting that the cyclist is acquiring and identifying information relatively superficially. These findings have implications for motorcycle accidents in which the cyclist fails to detect vehicles turning left, oncoming vehicles, crossing vehicles, and pedestrians. Motorcyclists, automobile drivers and pedestrians should all be informed of these facts.

by Yasuhisa Nagayama; takanobu Morita; Toshiaki Miura; Junichi Watanabem; Nobuo Murakami
Osaka Univ., dept. of Traffic psychology, Japan; Kawasaki Heavy Industry, Japan
Rept. No. SAE-790262 ; 1979 ; 15p 7refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 292

PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER

Recent changes in product liability law, and in the magnitude of jury awards, dictate that motorcycle designers shift their design priorities. Since a relatively recent California court decision (the Ault decision), a designer must approach development of new products, or new models of and existing product, with the full knowledge that if he creates a safer design than his company previously manufactured and sold, all previous products may be judged in accordance with the safety or performance of the new, improved version. The Barker vs. Lull decision (early 1978) effectively eliminates most of the previous burdens of proof from the plaintiff in a product liability case. To the other costs of a motorcycle design, costs of insurance and/or directly paid litigation costs must be added. If enormous "punitive damage" claims continue, which is indicated, it will be incumbent upon the motorcycle designer to consider how much exposure, or potential liability, a particular design might represent in court. If a little more money must be spent in a design to reduce potential product liability exposure, then this expense must be evaluated in light of potential financial and adverse publicity losses in court. The astonishing increase in out-of-court settlements is related to the increasingly liberal interpretation of product liability laws by the courts, and the tremendous rise in defense costs. Product liability litigation demands serous consideration by the motorcycle designer at the concept stage and throughout final hardware development.

by Jon S. McKibben
McKibben Engineering, Inc.
Rept. No. SAE-790264 ; 1979 ; 8p 2refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 293

EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE

Experiments on four large (650 cc to 900 cc) motorcycles of Japanese manufacture to study machine lateral motion involved analysis of pulse response, high-speed random response, and land-change response (straight or near-straight course runs), and ramp step response and slalom response (curved course runs). Results of each experiment were arranged as frequency response functions (input, output) by random signal analysis. Three primary oscillation modes (capsize, weave, and wobble) were studied. Steer torque and rider lean angle were considered as independent rider control inputs, and both single-input and dual-input analyses were conducted. The major input factor was found to be torque, with lean angle by itself having almost no influence on output.

by Akira Aoki
Japan Automobile Res. Inst. Inc., Japan
Rept. No. SAE-790265 ; 1979 ; 19p 14refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 294

EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES

Analytical and experimental studies investigated the transient and oscillatory behavior of three example motorcycles (lightweight, intermediate, and heavyweight). The effects of adding load, changing operating conditions, and modifying vehicle configuration were examined. It was found that adding a rear load of 10% gross vehicle weight can lead to weave oscillations in some cases, particularly in near-limit, steady turns where the suspension is compressed and the normal load on the tires is greater; the rear load plus the weight of the rider and instrumentation, can bottom the suspension in extreme cases. Analyses showed that adding a large, rear load can also decrease the wobble mode damping. Damping rear suspension motions can reduce or eliminate the cornering weave problem, consisting of coupled lateral and longitudinal motions in a particular speed range. Adding weight to the front fork assembly ahead of the hinge line increases the mass and steer moment of inertia; this tends to decrease both weave mode damping and natural frequency. The presence of a fork-mounted fairing transmits aerodynamic forces and moments directly to that assembly. Aerodynamics disturbances can apparently excite the wobble mode at high speed, while the corresponding no-fairing case has no wobble oscillation. The fairing tends to decrease the wobble mode frequency somewhat. Oscillatory behavior existed only when one or more of the following conditions were present: very high speeds, adverse loadings, hands-off operation, near the limit of performance (e.g. in a high lateral acceleration, steady-state turn), and degraded components (e.g. shock absorbers). the cornering weave phenomenon tends to arise in high lateral acceleration, steady turns when the weave mode natural frequency (which is speed-dependent) is in the vicinity of the pitch mode (rear suspension) natural frequency. The lean angle is sometimes determined by ground clearance. A large steer torque pulse sometimes excites a persistent directional oscillation, not otherwise present.

by David H. Weir; John W. Zellner
Systems Technology, Inc., Hawthorne, Calif.
DOT-HS-6-01381
Rept. No. SAE-790266 ; 1979 ; 20p 11refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 295

ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS

Low-center-of-gravity, long-wheelbase motorcycle configurations were investigated analytically in terms of stability, obstacle avoidance characteristics, and braking performance, using mathematical models of both the uncontrolled and rider-controlled motorcycle. Both front- and rear-steered configurations were studied. The rear-steered configuration was found to have unacceptable stability and controllability characteristics; this was confirmed by tests on a buck. On the basis of the analytical results, the front-steered configuration appears to have an advantage in improved obstacle avoidance performance at other than very low speeds, with stability at least equal to a conventional machine. Another potential advantage is in reduced sensitivity of the front-to-rear brake proportioning to lateral acceleration and road conditions. Offsetting these advantages to a degree are a degradation in low-speed manueverability and controllability, and weight and overall complexity of the machine.

by Robert Schwarz
South Coast Technology, Inc., Santa Barbara, Calif.
Rept. No. SAE-790258 ; 1979 ; 16p 3refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by National Hwy. Traffic Safety Administration.
Availability: SAE

HS-026 296

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY

The development program in RRIM (reinforced reaction injection molding) established at Ford Motor Co. in Jul 1977 to investigate the suitability of the process for molding automotive exterior body panels is described. The four main areas evaluated are equipment capability to handle reinforcing agents (monitored for relative degrees of abrasiveness, settling, and clogging characteristics); fiber reinforcements and their effect on coefficient of linear thermal expansion (CTE); processing characteristics of fiber-filled materials (viscosity, cycle time); and physical properties of the high-modulus and rigid RIM materials (automotive Class-A surface, heat sag, impact strength, CTE, fiber orientation, flexural modulus, paintability). The RRIM trials and material testing indicate that RRIM is already a feasible process for exterior body panels requiring a Class-A surface finish. Further improvements needed in the process include internal mold release, light-stable substrates, heat stability at 400 degree F, mixing head to handle abrasive slurry, and advances in fiber technology. Future developments in the field of polyurethane (PUR) and non-PUR materials combined with milled and/or chopped fibers and other fillers could make the RRIM process a candidate for structural members.

by Michelle J. Mikulec
Publ: Modern Plastics v56 n5 p136, 138, 140, 144 (May 1979)
1979
Based on Processing Award paper presented at SPI RP/
*COMPOSITES Inst. Conference, New Orleans, Jan-Feb 1979.
Availability: See publication

HS-026 297

ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]

Advice is given to the motorist on how to combat the dishonest practices of unscrupulous service station attendants (estimated at 2%) who try to sell drivers unneeded products or services. Regular car maintenance by a reliable mechanic and learning as much about one's car as possible are recommended. When a problem is reported by an attendant, the motorist should examine the reported defect, and should act as if he understands the problem; if the mechanic uses technical jargon, the motorist should insist on a simple explanation. It is emphasized that emergency repairs should not be authorized hastily; a second opinion should be obtained if possible. A damaged tire should be changed, but a spare will probably work adequately for a short distance; a set of tires should never be bought from an out-of-the-way station. If a decision is made to have a repair done, the car owner should find out what is involved in the procedure and how much it will cost before the work is started. A signed, detailed receipt and the bad parts should be obtained. When paying for gasoline, oil, and other services, the motorist should be certain about the currency tendered, should count his change, and should walk to the credit card imprinter with the attendant and read all invoice slips carefully. If the motorist feels cheated, he should write a letter(s) to the oil company involved, an auto club, attorney general's office, and/or the state's consumer affairs office.

by Richard Bauman
Publ: California Highway Patrolman v43 n3 p16-7, 52 (May 1979)
1979
Availability: See publication

HS-026 298

THE USED-OIL RECYCLING PROGRAM

To eliminate the environmental hazards of improper disposal of use motor oil, the California Legislature passed the Used Oil Recycling Act in 1977. The bill (SB 68) appropriated $100,000 to the Solid Waste Management Board to set up collection stations for used oil, to adopt a set of rules governing the collection and disposal of that oil, and to educate the public on the merits of the reclaimed product. Solid Waste Management has now organized a network of over 2000 collection facilities (automotive service stations, auto repair shops) throughout the state where the do-it-yourself oil changer can deposit the drainings. All used-oil receiving facilities have signs posted announcing their participation, and any retailer selling motor oil for off-the-premise use is required by law to post a sign indicating the location of a nearby collection facility. Donors are not currently paid for the used oil; collection stations receive 5 cents/gal from oil re-refiners for the used product (about 30 million gal of crankcase oil presently recycled annually). About 80% of the motor oil is currently being reclaimed, 10[illegible] million gallons as crankcase oil, 13[illegible] million gallons as fuel oil, and 6 million gallons as road oil or asphalt. Among the available reclaimed motor oils, which must meet Federal quality standards, are Mor-Lube, Rexol, and Modern. Various truck lines and taxi companies, as well as the City of San Diego, are using re-refined motor oils in their fleets. The Calif. Dept. of Transportation is conducting a test program of fleets using the recycled oils. Solid Waste Management hopes that at least half of the 80 million gal of motor oil sold annually will be re-refined.

by Pat Washburn
Publ: California Highway Patrolman v43 n3 p18, 54 (May 1979)
1979
Availability: See publication

HS-026 299

LEMON AID [ADVICE ON BUYING A USED CAR]

For prospective purchasers who are not versed in mechanics, suggestions are provided for avoiding mistakes in buying a used car. The first step is to make a firm decision on type of vehicle wanted and affordable price. Among sources of used cars, consideration should be given to the newspapers' want ads, and other sources (auctions, sales lots of big car rental agencies, new-car trade-ins on dealers' lots). Dealers' warranties should be examined critically. A thorough examination should be made of a prospective purchase, including a walkaround, a drive, and a mechanic's inspection. Walkaround checks include the paint job (look for blisters, and if exterior paint matches interior spots, e.g. trunk), odometer reading (over 10,000 to 12,000 mi/yr is excessive, much less than that indicates excessive city driving), driver's seat and pedals (if newer than car, could indicate rough use of vehicle), tires (for even wear, and matching), shock absorbers (bounce test), latches (locked and unlocked), brake pedal, under the hood (especially for leaks), and engine-start conditions (gauges and lights on panels, abnormal sounds, color of exhaust). The driving test checks include steering wheel play; gear changing for automatic and manual transmissions; wheel alignment (check for turn-in, turn-out, or wobble while someone else is driving); firmness of accelerator, brake pedal, and clutch; and working order of all controls, signal lights, buzzers, and gauges. The final inspection should be by a reliable mechanic.

Publ: Driver v12 n12 p14-6 (May 1979)
1979
Availability: See publication

HS-026 300

A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]

Ten risky driving situations are described and various ways to handle them are provided in a multiple-choice quiz (with the best answer provided and explained). The following types of situations are coverd: right-side wheels dropping off pavement and onto a sharply-dropping shoulder when forced off the road while driving legal speed limit on four-lane highway; an oncoming car on a two-lane highway attempting to pass without knowing there are two cars to overtake instead of one; momentary blinding by an oncoming car with high beams; car stalled on a railroad crossing with a train coming; unexpectedly approaching a bridge covered by a thin film of ice; going too fast for a particular curve; lighted cigarette falls from hand and rolls under seat; brakes fail when going 30 mph down a hill in a business district and approaching traffic signal that has just turned red; rounding a curve on a 55-mph, two-lane country road only to find a bull slowly walking across the road not 100 ft away; and driving on the inside lane on a four-lane undivided city street with traffic on both sides when the car jerks forward once and comes to a stop.

Publ: Driver v12 n12 p22-7 (May 1979)
1979 ; 1ref
Availability: See publication

HS-026 301

A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION

The design and construction are described of a system to collect traffic data and transfer them to a central computer for processing, as well as the recent use of the new system in observations of traffic behavior at T-junctions. A comparison is made with an earlier system which involved videotaping of T-junction traffic behavior, incorporating a digital clock image, analyzing the tapes in slow motion and noting the event and clock time, transferring the output (a list of events and times to the nearest tenth of a second) to punched cards, and analyzing by computer. The new microprocessor-based system was sought to reduce the time and effort required by using data input manually by observers and data from automatic sensors. The data collection equipment is the Golden River mk4 system, a modular system based on a microprocessor. It has facilities for using random access memory and programmable read-only memory, a real-time clock, a number of input and output facilities, and its own power supply. Analysis of traffic data using this system is comparatively easy and much quicker than video techniques. The accuracy of the data is limited by the accuracy of observers in a real-time situation. The equipment, although fairly bulky, is portable; a second smaller version is being designed. The system could be used for other data collection purposes and could be adapted for many computing tasks.

by P. C. Storr; Jenny Wennell; M. R. C. McDowell; Dale F. Cooper
Publ: Traffic Engineering and Control v20 n4 p156-8 (Apr 1979)
1979 ; 8refs
Sponsored by Transport and Road Res. Lab. (England).
Availability: See publication

HS-026 302

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS

Mathematical analysis demonstrates how the suitable placing of automatic traffic counters can reduce the number of traffic observers required for recording vehicle turning movements at intersections. Equations are derived and applied for traffic counts at three- and four-arm junctions. Three options are studied for a crossroads situation; it is assumed that the proportion of traffic from one road turning right is known, that the proportion of traffic from one road that goes straight onto another road can be estimated or that the proportion of traffic from one road that will turn left can be estimated. It is shown that by an appropriate choice of option and use of local knowledge (e.g. that there is no right turn) or historical data, good estimates, even 100% accurate results, may be obtained, using fewer than one observer per arm at an intersection. It is shown that if a certain value cannot be estimated, its value can be limited to a practical range and hence the largest practical range of values can be found for the traffic flow.

by M. L. Marshall
Publ: Traffic Engineering and Control v20 n4 p159-62 (Apr 1979)
1979
Availability: See publication

HS-026 303

A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS

A new hardware/software road traffic simulator employs microprocessors in a parallel configuration. Each of two microprocessors simulates the performance of each intersection in a traffic network with a further microprocessor as an overall controller. With each one of the set of microprocessors operating essentially in parallel, organizational problems are minimized, and overall speed is no longer a function of network size. The degradation of speed as the network size increases is minimal. Input and output of traffic data are facilitated through the use of a minicomputer equipped with visual display unit and cartridge-disc store to which the hardware model is attached as a special-purpose peripheral. This approach facilitates overall control and the application of appropriate traffic signal control policies. If simulation speed is high, it also provides the possibility of predictive control policies. Cost considerations have restricted the model to a small size, although the modular structure allows easy expansion.

by M. G. Hartley; G. Bevilacqua
Publ: Traffic Engineering and Control v20 n4 p172-6 (Apr 1979)
1979 ; 6refs
Availability: See publication

HS-026 304

TURBOCHARGING: WHAT DOES THE FUTURE HOLD?

Various approaches and options in the design of automotive turbocharges are discussed. The movement to backswept impeller blades in the new small units is considered. Means of avoiding overboosting the engine at high engine speeds (exhaust wastegate, adjustment of the turbine nozzle flow area) are outlined. Two-stage turbocharging (i.e. two turbo units placed in series) is mentioned as a design option. The Hyperbar system is cited as an example of an approach to maintaining high turbo speeds by the use of exhaust augmentors or combustors. The application of turbocharging, and associated problems, to diesel passenger cars and gasoline engines are discussed. It is felt that if low-priced turbochargers become available in mass production for the gasoline engine, they will undoubtedly be used on many passenger car diesels. Technical work in progress relates to turbocharger reliability and installation, fuel system control, boost pressure control, increasing low-speed boost, and reducing turbo lag. Placement of the throttle before or after the turbocharger compressor in a gasoline engine and its effect on compressor efficiency are discussed. A comparison is provided of the advantages and disadvantages of positioning the carburetor either upstream or downstream of the compressor section.

Publ: Automotive Engineering v87 n6 p26-30 (Jun 1979)
1979
Based on papers included in HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines."
Availability: See publication

HS-026 305

AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS

Design of General Motors' 1980 front-wheel-drive X-cars demonstrates that substantial fuel economy improvements can result from aerodynamic studies at the beginning of the design cycle. Fuel economy gains from aerodynamic drag reduction are equivalent to a weight loss of about 118 kg via downsizing or lightweight material substitution. The average coefficient of drag of the 1980 X-cars (0.442) is 0.070 lower than the average of 11 domestic and import family-type cars measured, and only 0.016 higher than the average of eight sports cars. The aerodynamic drag force (proportional to drag coefficient times frontal area) of the 1980 X-cars also compares favorably with the same 11 family-type cars. The lower drag coefficient and frontal area of the 1980 Chevrolet Citation 4-door hatchback vs. the 1979 Nova 4-door sedan result in a saving of 1.4 mpg composite fuel economy at a level of 25 mpg. Improvement in aerodynamic drag (1.2 mpg) is the largest source of mpg improvement other than the 363 kg weight reduction. The improvements were quantified in a computer simulation, "GPSIM." The aerodynamic program had five basic stages, beginning with the development of a basic overall appearance theme of the car compatible with low aerodynamic drag. Both 1/4- and full-scale clay models of each X-car division (Chevrolet, Pontiac, Oldsmobile, and Buick) were tested, followed by tests on prototype and pilot line cars. Pros and cons of testing quarter-scale and full-scale models are tabulated. After wind tunnel testing, each of the prototypes was given a coastdown test. The three-year program ended with a coastdown testing of pilot line cars. Four other design goals involving aerodynamics were ample radiator flow for engine cooling and minimizing electric fan running time, reduced wind noise at windshield pillar and side mirrors, minimum side glass contamination from road splash, and adequate ram air ventilation of the passenger compartment.

Publ: Automotive Engineering v87 n6 p35-41 (Jun 1979)
1979
Based on SAE-790724 "An Effective Aerodynamic Program in the Design of a New Car," by Lloyd Nedley. See also HS-026 306 and HS-026 307.
Availability: See publication

HS-026 306

CHEVROLET DESIGNS AND BUILDS A NEW V-6

The Chevrolet Div. of General Motors (GM) was assigned design and manufacturing responsibility for a v-6 powerplant which would provide optional extra power and performance for GM'S 1980 x-car program. The engine is currently available in the Olds Omega, Buick Skylark, and Pontiac Phoenix, as well as the Chevrolet Citation. The 60 degree v-6 engine is placed transversely in the vehicle, with the flywheel on the driver's side. Since vehicle packaging was established by the time a firm decision was made to design an optional engine, the engine compartment dimesions were well-defined, adding space constraints to the other reasons for a 60 degree bank angle. Overall width of the engine with accessories is 657 mm or 101 mm less than that of the Chevrolet 90 degree v-6. Overall engine length is 536 mm; the electrically-driven cooling fan is mounted to the radiator support structure, rather than the engine. Although cast iron was used for both block and heads, the design philosophy was to minimize weight. The v-l, 2.8-L engine is tuned to deliver 86 KW (115 hp) at 4800 rpm and 196 N.m (145 lb. ft) at 2400 rpm, the actual torque curve being flat and broad. Because of the shape of the power curve, wide-open-throttle shift speeds with automatic transmission are calibrated to 5300 rpm, 500 rpm over the peak, but a speed which delivers greater vehicle acceleration. The vehicle, equipped with v-6 and automatic transmission, is estimated to deliver 20 mpg city, 30 mpg highway, and 23 mpg combined.

Publ: Automotive Engineering v87 n6 p42-50 (Jun 1979)
1979 ; 1ref
Based on SAE-790697 "The General Motors 2.8 Liter 60 degree v-6 Engine Designed by Chevrolet," by David A. Martens. See also HS-026 305 and HS-026 307.
Availability: See publication

HS-026 307

GM ACHIEVES FUEL ECONOMY VIA SYSTEMS ANALYSIS

techniques for optimizing fuel economy in the design of General Motors' 1980 front-wheel-drive X-cars involved reduction of road load and parasitic losses combined with powertrain matching to the vehicle as a system. Initial parametric studies, using the GPSIM simulation program in the concept definition stage, indicated many fruitful areas for fuel economy improvement (e.g. reduction of aerodynamic resistance, tire rolling resistance, and brake drag; optimization of gearing). Using GPSIM, each component of the vehicle and the power transmission system was analyzed to determine accurately the effect of a change in that parameter on fuel economy. Optimization of the vehicle as a system required that the most influential subsystems have characteristics which could be relied on to perform predictably in the final car in order to avoid mismatching of powertrain parameters to the vehicle. Target characteristics affecting economy and performance were defined, usually preceding the actual design. With definition of basic vehicle parameters (e.g. frontal area, weight distribution), and with targets for mass, aerodynamic drag, and tire losses, powertrain matching analyses were made of transmission gearing, torque converter characteristics, final drive ratios, and engine displacement requirements to meet performance targets. Each component was also examined to minimize its parasitic losses. The result of the fuel economy optimization program is the base engine 1980 X-car with automatic transmission having a composite fuel economy rating of 26.7 mpg, a 37% improvement over the 1978 X-car (19.4 mpg); while about 3.6 mpg were gained directly from reduced size and weight, the remaining 3.7 mpg resulted directly from road load and parasitic loss decreases and powertrain optimization.

Publ: Automotive Engineering v87 n6 p52-7 (Jun 1979)
1979 ; 1 ref
Based on SAE-790721 "Design for Fuel Economy--The New GM Front Drive Cars," by F. C. Porter. See also HS-026 305 and HS-026 306.
Availability: See publication

HS-026 308

AN UNCOOLED, UNLUBRICATED DIESEL?

High-performance ceramic materials may eventually permit designers to omit cooling and lubrication system from heavy-duty diesel engines. If current research and development programs are successful, it may be possible to produce an uncooled diesel engine of high thermal efficiency in conjuction with turbocompounding. Through the use of turbocharging to compensate for decreased volumetric efficiency, and a turbocompounding device to convert the increased exhaust energy of a hot adiabatic engine to useful power, improved thermal efficiencies result. With the hot adiabatic engine concept, the cooling system is completely eliminated. The minimum-friction unlubricated engine may be made possible with high-performance ceramics, but according to Cummins Engine Co. and the U.S. Army Tank Automotive Res. and Devel. Command, no present high-performance ceramic can fulfill all the required properties for the diesel engine. zirconia and lithium aluminum silicate glass ceramics feature low cost and ease of process control, but lack the high strength required for the diesel. A laboratory adiabatic diesel engine has been designed and built around Cummins' six-cylinder NH engine in order to demonstrate technical feasibility of an adiabatic turbocompound engine of advanced ceramic design. Three cylinder builds of the basic engine were made, each emphasizing different materials (metallic, hot press silicone nitride (HPSN), and glass ceramic). The high-strength, high-temperature true capability of HPSN offers the best chance of success during preliminary feasibility demonstration.

Publ: Automotive Engineering v87 n6 p59-61 (Jun 1979)
1979 ; 1ref
Based on SAE-790645 "Ceramics in Heat Engines," by R. Kamo and W. Bryzik.
Availability: See publication

HS-026 309

FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS

New requirements for friction lining materials exist because of the elimination of asbestos in brake and clutch compositions and the use of small pads for downsized and compact cars. Research on solid friction control additives at Dow Corning Corp. has produced new technology by which friction and wear properties can be tailored to specific requirements. Compositions of phenolic resins (binder in friction composites) with high loading of molybdenum disulfide, MoS2 (European use as friction modifier) and Dow Corning's Friction Modifier "A" were tested on an Alpha LFW-1 friction and wear testing machine. Addition of either friction modifier provided a reduction in wear and friction; the resin with "A" gave generally lower initial coefficients of friction and wear values and changed less with time. Friction Modifier "A" gave a more constant coefficient of friction with changes in speed, load and time. At higher speeds and lower loads, no difference in wear was apparent between MoS2 and "A". Good correlation was found between LFW-1 test results for three different brake compositions (Class A, high in asbestos and organic components; Class B, less asbestos and organic components plus some inorganic components; and Class C, semimetallic nonasbestos composite) and their general characteristics. Class C gave the most stable frictional properties, but also produced the most noise. Addition of 10% Friction Modifier "A" to Class C resulted in more consistent coefficient of friction properties between 600 and 1200 rpm, and less noise. Comparisons between the new friction modifier and MoS2 in brake pad Compositions during dynamometer testing showed the following advantages for the new additive: lower noise, less dependence of friction coefficient on temperature, decreased wear of brake pad (30% increase in lifetime), and decreased wear of metal disc.

Publ: Automotive Engineering v87 n6 p74-6 (Jun 1979)
1979
Based on SAE-790717 "Controlled Friction Additives for Brake Pads and Clutches," by Harry M. Schiefer, and George V. Kubczak.
Availability: See publicatiroad

HS-026 310

AIRBAG GAS GENERANT SIDE EFFECTS STUDIED

The all-chemically-generated gas system (pyrotechnic) of air bag restraint systems (ARBS) contains sodium azide as the propellant. Unburned sodium azide is apparently toxic to humans, animals, vegetation, and microorganisms in small concentrations; long-term effects are not well-known. When the compound burns, it produces harmless nitrogen and small amounts of strongly alkaline Substances, which in normal air bag deployment do not reach the passenger compartment. The DL-*Z113 propellant based on sodium azide is classified as a Class C explosive. The hybrid ABRS uses stored gas (argon) supplemented by propellant (potassium perchlorate with polyvinyl chlaride and cabon black). The dosages of this propellant resulting in adverse health effects are much higher than any intake which might occur with its use in air bag inflators. Unwanted combustion products, including carbon monoxide, occur when potassium perchlorate is burned. The manufacture of the various gas generant chemicals should require no more than routine precautions. Besides the toxicity of the generants and products during normal deployment, other ABRS use considerations are exposure during theft, mounting add-on equipment, or replacement after crash. Concerning salvage operations, it appears that the ABRS would be left alone or deliberately deployed rather than removed. Of the disposal options (baling, shredding, and large-scale furnace melting), shreadding appears to present the greatest potential hazard.

Publ: Automotive Engineering v87 n6 p82-4 (Jun 1979)
1979
Based on SAE-790640 "Selected Aspects of Gas Generants Research," by J.T. Herridge; SAE-790643 "The MVMA Gas Generants Investigation," by Serge Gratch and Carl C. McConnell; and SAE-790641 "An Investigation of the Potential Human and Environmental Impacts Associated with Motor Vehicle Air Bag restraint Systems," by Lawrence J. Partridge, Jr., and G. Stewart young.
Availability: See publication

HS-026 311

FUEL HOSE PERMEATION: AN EMISSIONS PROBLEM?

New fuel hose material with improved resistance to degradation, volume increase, and permeation by aliphatic/aromatic fuels will be required as regulations decrease the amount of allowable hydrocarbon (HC) and fuel compositions change. Immersion tests were conducted to study the effects of temperature, hydroperoxide (formed by reaction of HC fuels with oxygen, "souring" of gasoline), and catalyst concentration on physical properties of such current fuel hose construction materials as fluorocarbons, epichlorohydrin (ECO), and nitrile (NBR). Permeation tests were conducted on these hose materials using fluid A which represented the maximum anticipated aromatic content of current and future automotive fuels, and fluid B which was representative of the current unleaded aromatic fuels. During immersion testing, a bisphenol-cured fluoropolymer and a diamine-cured fluoropolymer showed excellent resistence to "sour" gasoline. In permeation testing, thin diaphragms of Viton GH fluorocarbon elastomer (FKM-1) had low permeation rates in fluid A, which decreased with increasing elastomer thickness. Still lower permeation rates were found for fluid B. ECO underwent reversion during immersion testing in "sour" gasoline. Diaphragms of Hydrin 100 (ECO-1) had good resistance to permeation in fluid A; after 21 days, samples had a weight loss equal to about 19% of total fuel, compared to 40% fuel loss for the best NBR compound tested and 22% and 25%

for Hydrin 200 copolymer (ECO-2) and Hydrin 400 copolymer (ECO-3), respectively. Fluid B permeation rates were considerably lower in comparison. NBR underwent additional vulcanization in immersion in "sour" gasoline. Diaphragms of NBR-1 (Chemgum HR-765 with sulfur cure) had high permeation rates in fluid A, with NBR-2 (Chemgum HR-765 with perioxide cure) having higher rates. Permeation characteristics for fluid B were similar. Overall, equilibrium permeation rate was far lower for FKM-1

Publ: Automotive Engineering v87 n6 p86-8 (Jun 1979)
1979
Based on SAE-790657 "Automotive Fuel Permeation Resistance: A Comparison of Elastomeric Materials," by J.D. MacLachlan; and SAE-790659 "Effect of (Sour) Gasoline on Fuel Hose Rubber Materials," by A. Nersasian.
Availability: See publication

HS-026 312

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL

An N-type, run-flat tire has been developed at Nissan Motor Co. Ltd. (Japan) which is used on a conventional wheel and has a simple structure with reinforced side walls and additional beads to fit rim flanges. It requires a conventional air valve and can be mounted with standard tire changers. Although the tire weighs 26% more than a conventional tire, the wheel assembly weighs only 15% more. About 6 kg can be saved per vehicle because the spare tire is unnecessary The N-type, run-flat tire meets all requirements for the Japanese Automobile Tire Manufacturers Assoc. standards for high-speed performance and load endurance. Bench tests and vehicle testing were conducted for run-flat endurance and characteristics, cornering stiffness, steering and stability, frequency response, transient response, steerings wheel effort, riding effort, and fuel consumption. The tires provide vehicle stability and mobility after tire deflation. During field testing of 15 vehicles over a total distance of 600,000 km, some punctures occurred. After running for 20 km to 120 km (average 65 km), the deflated tires were found to be normal and repairable.

Publ: Automotive Engineering v87 n6 p91-3 (Jun 1979)
1979
Based on SAE-790668 "Development of the N-Type Run-flat Tire and Its Evaluation in Vehicle Dynamics," by Keiichiro Yabuta and Hiroaki Nishimura.
Availability: See publication

HS-026 313

TRAFFIC ON UTAH HIGHWAYS 1978

Average daily traffic volumes are tabulated on road sections of varying lengths in Utah during 1978 (and 1977 for comparsion); color-coded information is provided for the state highway system, Federal-aid urban local highways, Federal-aid secondary local highways, and Federal-aid primary highways not on the state system. A manual vehicle classification summary indicates the percentages of types of vehicles (Utah passenger vehicles, out-of-state passenger vehicles, light trucks, heavy trucks) using the various highway systems. Another tabulations depicts the following traffic data from all permanently located traffic counting machines: average traffic by day of week each month, average weekday traffic by months, average day of week traffic by months, the average day percentage of the average weekday, the monthly daily average percentage of the yearly daily average, and percentage breakdown by vehicle types for the yearly average. Unbound traffic volume maps are provided in an attached pocket.

Utah Dept. of Transportation, Travel Analysis Unit, First Security Bldg., Room 800, 405 S. Main St., Salt Lake City, Utah 84111
1979 ; 241p
Prepared in cooperation with Federal Hwy. Administration.
Availability: Corporate author $10.00

HS-026 314

RECENT TRENDS IN TRAFFIC INJURY

A series of graphs is presented and discussed which show the changes in the nature of injuries sustained in road accidents in Great Britain over the period 1958-1975. The Register-General's Satistical Reviews of England and Wales, in which tables are based on death certificates for 1958-1975, and the Annual Report of the Hospital In-Patient Enquiry for 1964-1973, were examined. Causes of death, primary injury for hospital inpatients, and average length of hospital stay were analyzed. It seems that an increasing proportion of deaths are being ascribed to internal injuries and a decreasing proportion to skull fractures. A considerable year-to-year variation in the average length of hospital stay was noted, but no long-term trends were detected. An annotation by J. p. Bull comments on the possible relationship of increased use of helmets and seat belts, and improved clinical care, to the decreasing proportion of deaths attributed to skull fractures. A second annotation by J.M. Potter questions the accuracy of "head injury" and "skull fracture" as a cause of death on forms used by the Registrar-General and Hospital In-Patient Enquiry.

by T.P. Huntchinson; [illegible]r.a. Harris
Publ: Injury v10 n2 p133-8 (Nov 1978)
1978 ; 5refs
Availability: See publication

HS-026 315

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]

Procedures are described which were used by the Vought Corp. to fabricate automotive body components in graphite fiber reinforced plastic (GrFRP) for the Graphite 1979 Ford LTD. The effort was a joint venture with Milford Fabricating Co. (a subsidiary of the Budd Co.). Master tooling aid development, high-temperature epoxy molds, and component fabrication are discussed. During an eight-month period, 30 high-temperature epoxy bond-molds and 30 graphite reinforced plastic, car body components, of a highly complex configuration, were successfully fabricated. Aerospace technology and experience made a major contribution to the auto industry in this project to utilize GrFRP to reduce vehicle weight for improved fuel economy.

by W. R. Kiefer; A. L. Mills; T. p. Bellinger; G.H. White
Vought Corp., Dallas, Tex.
Rept. No. SAE-790028 ; 1979 ; 8p
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: See publication

HS-026 316

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS

The phase perturbation of an audio tone transmitted over conventional frequency-modulated mobile radio links at frequencies of 72MHZ, and 462 MHZ was investigated. Data are presented from stationary and moving vehicles in a variety of urban routes and in mountainous terrain. The effects of noise and multipath propagation are identified. Results are interpreted in light of the requirements of a particular automatic vehicle monitoring system, which is briefly described. Results indicate that, as far as the vehicle-base link is concerned, a vehicle-location system of the type described is a perfectly practical proposition. Analyses show that, even when a speech signal is only just receivable, 90% of the readings will be in error by 20 to 40 degrees, equivalent to line-of-position errors of the order of 100 m. The contribution of the radio link will generally be much less than this. In urban areas where multipath range differences are usually quite short, the phase spikes can result in very large phase errors (of relatively low probability). A location or communications system sensitive to these must contain means of detecting phase perturbations and rejecting the associated data. More severe multipath effects can occur in hilly or mountainous areas where the path differences are longer. Although, in general, the peak errors are no greater than those in the city, the overall satistics are worse because of the greater rate of occurrence and longer durations of the perturbations.

by J. David Last; Andrew J. Wade
Publ: IEEE Transactions on Vehicular Technology vVT-28 n2 p132-9 (May 1979)
1979 ; 14refs
Sponsored by Decca Survey, Ltd., Leatherhead, U.K.
Availability: See publication

HS-026 317

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS

The pros and cons of diesel engines in general are discussed in terms of fuel efficiency, fuel availability, price, starting, acceleration, maintenance, durability and availability. The Mercedes-Benz 300D, Cadillac Eldorado, Peugeot 504, and Oldsmobile Cutlass diesel models are rated in terms of engine and drive-train, front and rear accommodations, interior noise level, ride, normal handling, accident-avoidance ability, brakes, safety features, bumper protection, controls and displays, climate control, predicted repair incidence, periodic servicing, and miscellany. The advantages and disadvantages of each model are noted. A progress report on long-term durability testing of a 1977 Volkswagen Rabbit diesel and a 1978 Oldsmobile Delta 88 diesel is provided. Among the recommendations presented are the selection of the Mercedes-Benz 300D as the diesel of choice if money were no object (the price tag is $21,000), and the VW Rabbit as the best buy. The Rabbit delivers the best fuel mileage of any car available and has a price tag of between $5500 and $6000 (some dealers demand more).

Publ: Consumer Report v44 n6 p344-8, 350-2 (Jun 1979)
1979 ; 2refs
Availability: See publication

HS-026 318

25 ANTI-THEFT IDEAS [AUTOMOBILE PROTECTION]

Suggestions for the car owner to prevent theft of his vehicle (99% of thefts are preventable according to police auto-theft investigators) are provided under two categories: procedures and devices. Among the procedures it is recommended to roll up the windows, lock doors, and remove keys; to keep spare keys in wallet or purse; to have different keys for ignition, doors, and trunk (giving parking attendant only the ignition key); locking in the glovebox the vehicle registration and papers showing the owner's address; taking claim checks when leaving desirable items in plan view inside a car. Suggestions for parking so as to discourage vehicle theft include parking only in a driveway with engine facing the street or in a locked garage, and avoiding dark parking places. Antitheft devices are described by type and function; they include anti-entry devices (door locks, external and internal hood locks), disabling devices (fuel shutoff, battery disconnect, brake system lock, pedal clamp, steering wheel bar, steering column band), and alarm systems (switch alarm, electrical drain alarm, motion detector alarm, pocket-pager-type alarm, coded start systems, garage alarm). Another antitheft system is the sandblasting of a code number into every piece of glass in the car, with the code kept in a cental file accessible to police departments across the country on a 24-hour basis. In order to avoid a "purchase theft", it is advised not to let prospective buyer take car for a test drive by himself, and not to accept checks of any kind. As a purchaser, one should not buy a car that does not have correct paperwork, and one should compare the vehicle identification number with the number on the registration.

by Peter Frey
Publ: Motor Trend v31 n6 p65-7 (Jun 1979)
1979
Availability: See publication

HS-026 319

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]

various opinions about, and approaches to, driver licensing tests are discussed. The National Hwy. Traffic Safety Adminstration's (NHTSA) concern is to develop goals and research to improve the quality of driving and to suggest programs for the individual states to implement. Within NHTSA, there are those who feel that a driving test should be a severe test of the ability to control a vehicle, along with testing for observational ability and threat perception; others feel that the test should merely be a regulatory device and that post-licensing control is appropriate. A California driving instructor and former member of NHTSA'S Council on Advanced Driving advocates a tough licensing law, with far more emphasis on car control in driver's education courses. The chief of the Office of Traffic Safety in California believes an ability to work with vehicle dynamics should be required for a license; he also agrees with NHTSA that the major safety steps have already been taken, and that lowering the accident rate still further will require new driving attitudes on everyone's part. Since 1956, the British have been administering the Inst. of Advanced Motorists (IAM) hour and a half, 35-mile driving test (criteria listed in separate box) which demands rigorous standards of control, observation, and driving knowledge. Almost 150,000 persons have been admitted to IAM membership by passing the test, and their violation conviction rate is five times lower than that of the general public, and their accident rate 25% lower. It is estimated that if there were full implementation of this test (the test not nearly as available as the government test), that $200 million a year in accident damage could be saved. U.S. safety officials feel that a private, nonprofit organization such as IAM offers the most hope in affecting the licensing picture in America and that reduced insurance rates, as associated with IAM membership, is the best way to interest the general public in safer driving.

by Steve Thompson
Publ: Motor Trend v31 n6 p68, 70-2, 75 (Jun 1979)
1979
Availability: See publication

HS-026 320

ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT

An exploration was made of causal factors that explain why left-turn-vehicle pedestrian accidents are twice as frequent as right-turn accidents on one-way street networks; the New York City Police Dept. accident file was used in the analysis. Driver visual field and attention are indicated to be primary contributory factors in left-turning accidents. Lighting and signal placement are also factors that explain some of the differences between left- and right-turning pedestrian accidents. Recommended countermeasures include extensive driver education to improve awareness of hazardous left-turning maneuvers, redesign of vehicle to improve sight angles (optimum design being equal left- and right-turning sight angles, elimination of vent-window design and increased windshield wiper area); placement of additional traffic signal above the turning crosswalk at the far side of the interesection in order to improve driver's target detection and to increase eye contact; and environmental changes (improved lighting, a clear sidewalk 50 ft upstream of intersection, a 12 ft to 15 ft parking lane, and a 3 ft indentation (into the block) of the turning crosswalk).

by P.A. Habib; R.P. Edelstein; O.I. Nwankwor
Polytechnic Inst. of New York, Dept. of Transportation Planning and Engineering, 333Jay St., Brooklyn, N.Y. 11201
DOT-OS-70057
Rept. No. DOT/RSPA/DPB-50/78/28; PB-291 328 ; 1978 ; 76p 10refs
Availability: NTIS

HS-026 321

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT

A study was undertaken to evaluate the feasibility of using reflective sign sheeting, either engineering grade (Class I) or high-intensity grade (Class II), as background material for selected overhead highway signs, or using presently accepted nonreflective, opaque, procelain enamel backgrounds but without external illumination. Two sets of overhead signs were placed at two sites, at the junction of I-81 I-78 east of Harrinsburg, Pa., where motorist interviews and photometric readings were recorded. The results indicate that the motorists generally preferred the unlighted high-intensity signs as compared to unlighted nonreflective or engineering grade signs. Photometric readings indicated greatest contrast ratio with reflective button copy on the nonreflective background when not illuminated. It is concluded that signs with the reflective backgrounds and legends used in this study could fully provide an acceptable level of service when not self-illuminated on freeway-type highways with tangent section a minimum of 1200 ft in lenght. Illuminated, nonreflective signs with button copy yield high contrast ratios and provide a level of service equal to the alternate sign types tested. The individual states should have the prerogative of deciding which background type; legend, and illumination condition provide the best service in their areas of jurisdiction.

by Norman Bryan, Jr.; Donald Casner; Robert Klotz; Harold Knisley
Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120
Rept. No. FHWA-PA-78-19; PB-291 577 ; 1978 ; 46p 8refs
Sponsored by Federal Hwy. Administration
Availability: NTIS
1978 ; 62p refs
Availability: Corporate author

HS-026 323

AN ALTERNATIVE TO THE CRIMINALITY OF DRIVING WHILE INTOXICATED

The following negative aspects of conventional DWI (driving while intoxicated) enforcement programs are outlined: failure to change the behavioral attitude of the offender, lack of wholehearted support of the police, tendency to be unjust, corrupt, and self-defeating, and placement of defense counsel in a nonproductive and unsatisfying role. The following criteria are outlined for a successful DWI enforcement program: a substatial increase in arrests of offenders; a rapid, low-cost flow of apprehended drivers through the courts; a concerted, meaningful effort from many sources towards changing the behavior of the arrested offender; a finality to litigation and a probationary period to determine the effectiveness of the treatment program; an ongoing evaluation of the overall effectiveness of the program; and a balance of involved economic interests. In the three-year Park Forrest, Illionis, Lutheran General Hosp. Program for DWI offenders, a two-page information sheet is given to the offender, emphasizing the seriousness of the offense and defining possible sanctions if the offender proceeds to trial and pleads guilty or is found guilty. An alternative is offered to the offender to participate in a voluntary alcohol diagnostic evaluation test and recommended treatment program tailored to offender needs. The hospital evaluation program provides a psychosocial evaluation of drinking/drug impact on a person's functioning. Upon completion of testing procedures, the therapist outlines for the prosecutor his findings and recommendations. Copies of the report are given to the defendant, defense counsel, and arresting officer. In a petition, the parties ask the court to accept a guilty plea, record a finding thereof, set a temporary $100 fine and $5 costs, and honor a joint motion to vacate that finding and penalty after a one-year probationary period. The fine and costs are paid only if the motion to vacate is denied. The arrrest rate has been around 200 to 350 DWI cases annually for the Park Forest community of 34,000 with a recidivism rate around 3%. There have been no jury trial and only a few contested cases.

by Richard W. Hall
Publ: Journal of Public Science and Administration v5 n2 p138-44 (Jun 1977)
1977
Availability: See publication

HS-026 324

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]

Various statistics and opinions are cited concerning helmet usage by motorcyclists, with emphasis on mandatory helmet use laws. Information is provided on motorcycle helmet safety, standards, construction, and proper use. Although a 1974 National Hwy. Traffic Safety Administration (NHTSA) study found that nonhelmeted cyclists suffer three times as many fatal or serious head injuries as helmeted cyclists motorcyclists have apparently convinced Congress and most state legislators that government should not mandate helmet usage. A 1967 NHTSA rule withheld Federal highway funds from states not requiring helmet usage; by 1975, 47 states, the District of Columbia, and Puerto Rico had mandatory helmet laws. A 1976 law prevented NHTSA from enforcing helmet laws by withholding funds. At present, 29 states do not require motorcyclists 18 years or older to wear helmets. Motorcycle fatalities rose 24% in 1977 over 1976, although registration rose only1%. The motorcycle industry and motorcyclist groups have lobbied strongly on the Federal and state levels against mandatory helmet usage, with the right of personal choice proving to be the strongest argument. On the other hand, insurance companies, medical experts, and a Federal judge contend that society pays the bill when a helmetless cyclist is severely or fatally injured. Many physicians support helmet use legislation not only on the basis of medical research findings but also because of personal experience in emergency rooms. An American Medical Assoc. report compiling research by experts on both sides of the issue counters charges that helmets contribute to neck and spine injuries and cause accidents. Although the general consensus is that helmets increase the chances of surviving a motorcycle accident, motorcyclists are not pleased with the government's approach to motorcycle safety. Meanwhile, Federal and state regulators predict that helmet use laws may return when motorcycle fatality figures are made available.

Publ: Journal of America Insurance v54 n2 p24-9 (Summer 1978)
1978 ; 3refs
Availability: See publication

HS-026 325

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)

The braking and wheel-locking characteristics are examined of the conventional motorcycle brake system (separate actuation of the front and rear brakes) and the possibilities and problems associated with a new system being developed (simultaneous actuation of the front and rear brakes). Although the conventional system allows the experienced driver to achieve an optimal deceleration, the inexperienced motorcycle driver, accustomed to driving cars, fails to achieve the proper decelerations for a given road traction conditions. By locking a rear or front wheel too early, the novice motorcyclist initiates a fall which could have been avoided. The "combined" brake system with coupled rear and front brake actuation could help to prevent this type of fall. A detailed analysis indicates that it is difficult to design brake systems and pressure equalizers which would be satisfactory under all load and road conditions and which would always compensate for lack of rider skill.

by Henning Lupertz
Publ: ATZ Automobiltechnische Zeitschrift v81 n3 p99-102, 107 (1979)
1979 ; 18p 1ref
Translated from German (original 5p; translation 13p).
Availability: Reference copy only
1978 ; 14refs
Availability: See publication

HS-026 327

SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS

Automotive engine connecting rods are used as an example in applying an optimum manufacturing process selection algorithm. The technique used to compare manufacturing processes, a modification of Kepner-Tregoe Problem Analysis, involves the itemization of basic goals into small entities, settings of priorities on these goals, and summing the effect of how well each process option satisfies each specific goal. Prior to defining the goals or "wants", mandatory processing requirements or "musts" are determined. These "musts" (e.g. use available material, yield an acceptable part) are essential elements which serve as go/no go decisional criteria. Five processing scenarios (forging by gas slot heat and hammer forge, or by induction heat and press forge, nodular iron casting, hot formed powder metal, and precision warm forming) are compared in terms of the following goals: use of available material, minimization of energy use, reduction of vehicle weight, minimization of piece cost, high quality, minimization of investment, use of existing technology, viable steps to production, and positive safety, environmental, and personnel effects. Casting is determined to be the optimum connecting rod manufacturing process, based on the assumptions that a new product is involved and that a building is available without equipment or personnel.

by Dale A. Maynard
Chrysler Corp.
Rept. No. SAE-790023 ; 1979 ; 11p 1ref
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 328

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978

A "school bus"-type bus operated by the Ypsilanti (michigan) Boys Club, occupied by 56 boys and 2 adults, was southbound on I-75 near Tifton, Georgia, en route to Disney World, Florida. As the bus exited I-75 at a safety rest area, it went off the road while negotiating a right curve on the exit lane, overturned, and struck a tree. Three passengers were killed, and the driver and 25 passengers were injured. The probable cause of the accident was the driver's loss of directional control of the bus on the curve because of excessive speed due to the failure of the accelerator return spring, which resulted from improper maintenance. Contributing to the accident were severely underinflated tires, deteriorated suspension, excessive luggage on the roof, and driver fatigue. Since the accident bus did not transport pupils to school, it did not satisfy the requirements of the Michigan School Code of 1976 and did not have to be inspected. Although the weakened, fatigued accelerator return spring would probably not have been discovered through a periodic state-required vehicle inspection, a properly designed vehicle maintenance program should have identified the defect, resulting in its replacement.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-2 ; 1979 ; 29p 2refs
Availability: NTIS

HS-026 329

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977

A 1973 Dodge Van and a 1977 Peterbilt truck, pulling an empty 1977 Reliance full trailer, collided head-on during a moderate-to-heavy rainstorm on U.S. 91, 8 mi north of Scipio, Utah. The eight occupants of the van were killed, and the truck driver was injured. The truck driver said that when the vehicles were quite close and he believed the van driver was not returining to his side of the road, he thought that he must reduce speed to give the van driver time to straighten out. He said that after rapidly and firmly applying the brakes on both truck and trailer, the combination begin to skid. As he was attempting to steer out of the skid, he said that he attempted to engage the "jake brake", a device which increases the engine's braking capability but is intended for energy absorption during downhill operations. The physical evidence indicated that both vehicles were straddling the centerline at impact; the truck/full trailer was almost fully on the van's side of the road, while the van was just across the centerline. This evidence did not provide enough information to determine the movements of either vehicle before impact. Limits in this evidence and research data prevented confirmation or denial that the truck driver's alleged evasive actions were necessary, that they took place, or that they would have produced his described loss of control. During the evaluation, a significant lack of research data on the performance of lightly loaded truck tires, and the potential effect of varying pavement frictional quality was noted. The southbound pavement surface approaching the accident site was found to have a progressively lower and widely fluctuating wet frictional quality and an average wet frictional quality below recommended values. Standard pavement inventory test procedures would not have detected these pavement problems at the accident site. the probable cause of this accident was either or both drivers failed to maintain their vehicle in the proper traffic lane for undetermined reasons.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-1 ; 1979 ; 29p 8refs
Availability: NTIS

HS-026 330

DIESELS AND FOUR-WHEEL DRIVE

Among the most technically interesting exhibits at the 1979 Geneva Motor Show were several new diesel engines and four-wheel-drive vehicles. Peugeot has produced a turbocharged version of its 2.3 L diesel for the 603, with increased maximum output (51 KW to 59 KW), increased maximum power (4150 rpm vs. 4500 rpm), and maximum torque of 184 Nm at 2000 rpm (an increase of 40%). Peugeot's diesel for the 305 is a new unit based on the 1.45 L gasoline unit fitted to that car; maximum power and torque, respectively, are 36 KW at 5000 rpm and 87Nm at 2500 rpm. Two other new diesels from VW include the five-cylinder unit, now available in the Audi 100, and the six-cylinder unit in the Volvo 244 GL; specific outputs, respectively, are 51 KW and 60 KW at 4800 rpm, with maximum torques of 123 Nm at 3000 rpm and 140 Nm at 2800 rpm. Detail changes have been made to the diesels in the Mercedes-Benz 200D and 240D models, with outputs for the former increased from 40 KW to 44 KW, and for the latter from 48 KW to 53 KW. Volvo has enlarged its 2.1 L gasoline engine to 2.3 L for the 242 GT model, with a maximum power output of 103 KW at 5750 rpm, and maximum torque of 191 Nm at 4500 rpm. Saab's experimental car is intended to show the potential for turbocharging; the car develops 128 KW at 5500 rpm and 295 Nm at 3500 rpm. GM'S new 1.3 L engine features the crossflow aluminum cylinder head; this engine has an output of 44 KW at 5800 rpm and maximum torque of 97 Nm at 3200 rpm. The Land-Rover V8 engine has been revised to give more low-speed pulling power (maximum output limited to 68 KW at 3500 rpm, although maximum engine speed is 5000 rpm), and has a maximum torque of 225 Nm at 2000 rpm. Two new versions of the Chrysler Sunbeam are the Sunbeam lotus, which is powered by a 2.2 L version of the Lotus 16-valve engine, and the Ti, powered by a version of the Chrysler 1.6 L unit. The most significant of the four-wheel-drive vehicles are the Mercedes-Benz G Range and the VW Iltis.

by John Hartley
Publ: Automotive Engineer v4 n2 p14-7 (Apr-May 1979)
1979
Availability: See publication

HS-026 331

THE POTENTIAL FOR ACTIVE SUSPENSION SYSTEMS

The two fundamental deficiencies in the conventional approaches to suspension system design are the limiting performance characteristics of traditional passive element suspensions, and the limiting mathematical procedures used in the design of both passive and active suspensions. Since active suspensions offer considerable potential for overcoming the limitations of passive suspensions,the most appropriate method for designing them must be determined. The synthetic approach to the design of active suspensions has distinct advantages over the analytical procedures of conventional design methods, which involve analyzing the behavior of predefined suspension configurations, a process which requires considerable time and effort. The synthetic approach enables the desired dynamic characteristics to be assigned before the suspension is constructed and determines the most suitable suspension configuration. The synthesis of suspensions using modern control theories (optimal control theory, modal control theory) is a powerful design technique for both active and passive suspensions.

by H. B. Sutton
Publ: Automotive Engineer v4 n2 p21-4 (Apr-May 1979)
1979 ; 44refs
Availability: See publication

HS-026 332

EMERGENCY VEHICLE OPERATIONS COURSE

An Emergency Vehicle Operations Course (EVOC) was conducted throughout North Carolina by the Center for Safety and Driver Education at Appalachian State Univ., Boone, N.C. and the Safety Center at East Carolina Univ. The classroom session included two films: one called "Code Three," depicting a police officer on an emergency run to an accident scene, the other entitled "Six Deadly Skids," dealing with six different types of skids and the effect of each on the driver and vehicle. A slide presentation was used to describe each of the in-car activities and to aid in the discussion of physical and man-made laws. Students received a notebook (with various pamphlets includ-

ed). The main driving exercises, developed by Vehicle Dynamics Lab., involved skid control (braking, cornering, and power skids), serpentine course, evasive maneuvers, controlled braking, off-road recovery, and double-lane change. Each exercise was first presented in regular passenger sedans, then in both a van and a modular ambulance.

by Chris A. Gentile; Charles E. McDaniel
Publ: Emergency Medical Services v7 n4 p8, 10, 12, 56 (Jul-Aug 1978)
1978
Sponsored by North Carolina Office of Emergency medical services.
Availability: See publication

HS-026 333

FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.

Society of Automotive Engineers (SAE) Standards, Recommended Practices, and Information Report for surface vehicle tubing and fittings cover the following areas: coding system for identification of tube, pipe, and hose fittings; automotive tube fittings; spherical and flanged sleeve (compression) tube fittings; refrigeration tube fittings; hydraulic tube and hose fittings and hoses; tests and procedures for SAE 100R Series hydraulic hose and hose assemblies, and for high-temperature transmission oil hose, lubricating oil hose, and hose assemblies; hydraulic flanged tube; pipe, and hose connections, 4-bolt split flange type; hydraulic "O" ring; formed tube ends for hose connections; flares for tubing; low-carbon steel tubing annealed for bending and flaring (seamless, and welded and cold-drawn); low-carbon steel tubing (welded, and brazed, double-wall); welded, flash-controlled, low-carbon steel tubing normalized for bending, double flaring, and beading; pressure ratings for hydraulic tubing and fittings; seamless copper tube; metallic air brake system tubing and pipe; nonmetallic air brake system tubing; performance requirements for SAE J844d nonmetallic tubing and fitting assemblies used in automotive air brake systems; fuel injection tubing; automotive pipe fittings; automotive pipe, filler, and drain plugs; automotive straight thread filler and drain plugs; and lubrication fittings. New, technically revised, or editorially changed entries are indicated; a numerical index is provided.

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-HS-150 ; 1979 ; 146p
Availability: SAE

HS-026 334

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.

Society of Automotive Engineers (SAE) Standards, Recommended Practices, and Information Reports for iron steel as related to surface vehicles are provided under the following headings: rules, nomenclature, UNS; numbering system, and chemical compositions of ferrous metals; general data on steels; methods of testing steels; steel fasteners; spring wire and springs; ferrous castings; tool and die steels; ferrous materials; and ferrous and nonferrous--general. New, technically revised, or editorially changed entries are indicated; a numerical index is provided.

Society of Automotive Engineers, Inc., 400 Commonwelath Drive, Warrendale, Pa. 15096
Rept. No. SAE-HS-30 ; 1979 ; 253p refs
Availability: SAE

HS-026 335

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]

Dr. William Haddon, Jr., of the Insurance Inst. for Hwy. Safety (IIHS), spoke before the House Commerce Subcommittee on Oversight and Investigation, on child protection in passenger cars and vans. His address is summarized, with still photographs from the film sequences presented at the hearing. Filmed (slow motion) results of new IIHS crash tests using tests dummies and popular 1979 model vehicles showed the following situations: an unbelted mother crushing her lap-held baby violently into the car's instrument panel and windshield in a frontal crash of less than 25 mph; unrestrained children ejected from the open rear window of a station wagon in a 30 mph collision; two youngsters, unrestrained, being violently thrown about in a van crash of less than 25 mph; and an unrestrained infant, lying on the front seat, hurled forward in a 25 mph crash to collide with the long-known child impact area of the instrument panel. Other sequences of the film, showed how well even small children were protected in crashes when wearing adult safety belts. To reduce the toll of nearly 2000 children killed and thousands seriously injured annually in auto crashes, Haddon stated that action must be taken by state and local governments who can mandate child protection laws, the National Hwy. Traffic Safety Administration (NHTSA) which should amend its present Federal Motor Vehicle Safety Standards (FMVSS) in order to eliminate hostile vehicle interior structures, auto manufacturers who can properly design and build cars for occupant protection, and parents and other adults who can place children in restraints. NHTSA administrator Joan Claybrook told of agency efforts to require dynamic testing for child restraints and a current series of child restraint workshops, and Robert E. Vanderbeek, of the League Insurance Companies of Southfield, Mich., described his company's upcoming program for supplying child restraints free of charge to policyholders. In separate sections, it is noted that Joan Claybrook will push for revision of FMVSS 201, Occupant Crash Protection From Interior Impact, and Dr. Haddon calls for proper packaging of human cargo.

Publ: Status Report v14 n8 p2-7 (17 May 1979)
1979
Availability: See publication

HS-026 336

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]

Information is presented for the vacationing motorist on preparing his car for its journey, planning the trip, saving gas, keeping the children occupied, and staying awake. Vehicle preparation tips include inspection of the tires, belts hoses, oil, filters, steering system, transmission, suspension, exhaust system, electrical system, and brakes. Items to carry for on-the-repairs include spare tire and jack, assortment of tools, oil, some replacement parts, jumper cables, flashlight, flares, and first-aid kit. Travel planning suggestions include knowing exactly where you want to go, how far you can go on a tankful, where you want to be each night, mapping out the route getting the assistance of a local auto club, and calling ahead for reservations. Essential items not to be forgotten include driver's license, registration, proof of insurance, leave papers, checks and credit cards. To save gas, comfort, and for passenger comfort the car should not be overloaded. Travellers should be stingy about space, take along only minimal clothing, and distribute passengers (each to have a safety belt) and luggage evenly. Advice for entertaining the kids includes giving them coloring books and reading materials, assigning them tasks that require road watching, playing quiz games and singing, and stopping about every two hours for a break. Gas-saving tips include driving slower, at a constant speed (e.g. 50 mph), not accelerating or decelerating rapidly, minimizing use of air conditioning, avoiding unnecessary stops, having the car properly tuned, and having the tires properly inflated. Suggestions for staying alert include finding things to break the monotony, such as switching drivers, talking, playing word games and listening to the radio, and stopping for a break every few hours.

Publ: Driver v12 n12 p0-1, 3-12 (May 1979)
1979 ; 2refs
Availability: See publication

HS-026 337

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]

Tests of maneuverability at the rollover limit were made at the Univ. of Michigan's Hwy. Safety Res. Inst. on a full scale tractor/double trailer loaded to simulate a full gasoline load and equipped with outriggers to prevent overturn. The power unit was a short-wheelbase, 3-axle GMC cab-over-engine highway tractor; the lead semitrailer was a 9300-gal capacity Fruehauf tri-axle, 12' 8" high, with three internal compartments; the following trailer was a Fruehauf 7700-gal capacity tri-axle, 13' 3" high, utilizing a tandem-axel converter dolly. Overall combination length was 55 ft, and gross vehicle weight was 152,000 lb. In a simulated lane change as an emergency maneuver, it was found that the steering maneuver amplified at the converter dolly, and that the oscillation continued after the tractor had straightened out. Tests of a dolly hitch modification (a 4-point hitch making the dolly rigid in yaw and roll, but allowing verical and pitch movements) proved that this modification upgrades the full trailer roll stability to that exhibited by the lead trailer hitched to the tractor. The modified double has slightly less maneuverability than when using the 3-point, pintle-hook hitch, but is still more maneuverable than the long-wheelbase, single-trailer rigs. The tests also proved that the unmodified "A" train is unstable in yaw oscillation if only the rear compartment is loaded and speeds exceed 50 mph. In other testing, a total of 22 retaining bolts were added to the spring suspensions to reduce the lash space to 1/4" to 3/4". This minor modification resulted in a 15% improvement in roll stability. A third modification, lengthening of the wheelbase, offered little benefit to stability. It was concluded that, when modified with a 4-point hitch, the Michigan double-bottom tanker train may have better safety and fire hazard exposure than either the long semitrailer or the short Michigan single that was legislated.

Publ: Trailers/Body Builders v20 n3 p52-4 (Jan 1979)
1979
Based on SAE-781066 "Testing the Michigan Double-Bottom Tanker," by C.B. Winkler, R. L. Nisonger, and R. D. Ervin, presented at National Truck Meeting, Dearbon, Mich., 14 Dec 1978. See also HS-026 338.
Availability: See publicat

HS-026 338

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]

two stabilizing devices have so far been certified by the Michigan State Police for the following trailer in a double trailer transporting flammable liquids. Certification requires that a device provide antiroll support from the lead trailer, and prevent the full trailer from pivoting freely about the kingpin of the converter dolly (i.e. prevent jackkniffe). One device in the Fruehauf 4-point hitch, a very short link pinned to the rear of the lead trailer and to the front of the converter dolly of the following trailer. It locks out yaw and roll completely, allowing only vertical and pitch movements. With this device, the converter dolly no longer steers separately, but is positioned directly behing the wheels of the lead trailer. The other device is the Telescopic Steering Stabilizer patented by Truck Safety Systems, Inc. (Tecumseh, Mich.). This device is added above the regular tongue and hitch of the converter dolly; it locks out the roll of the following trailer and limits the trailer swing. It is connected directly to the rear of the lead trailer frame and the front of the following trailer frame. By 1981, gasoline will not be permitted in double-bottom trailers in Michigan; only the lead trailer will be allowed to haul gasoline. Since No. 1 and No. 2 fuel oils have a flash point above 70 degree (unlike gasoline) they may be transported in double-bottom trailers now and beyond 1981, if the train is equipped with a certified stabilizing device. Three papers concerning double trailer stability are cited: SAE-781064, SAE-781065, and SAE-781066.

Publ: Trailer/Body Builders v20 n3 p56-7 (Jan 1979)
1979 ; 3refs
See also HS-026 337.
Availability: See publication

HS-026 339

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.

Society of Automotive Engineers Standards, Recommended Practices, and Information Reports on surface vehicle lighting equipment and photometric tests cover circuit breakers; ignition switches; windshield washers/wipers; blower motor switches; cigar lighter receptacles; lighting terminology and identification codes; headlamps; lamp bulb retention systems; connectors and plugs; sealed beam headlamps; general service sealed lighting units; lamp bulbs; lenses and reflectors; signal lights; fog lamps; auxiliary low-beam lamps; motorcycle headlamps, turn signals, and electrical systems; tail lamps; stop lamps; license plate lamps; supplemental high-mounted stop and rear turn signal; side turn signals; cornering lamps; warning flashers; spot lamps; parking lamps; clearance, side marker, and identification lamps; backup lamps; reflex reflectors; emergency warning devices; service, maintenance, and emergency vehicles' flashing warning lamps; lighting inspection codes; headlamp testing machines; headlamp aiming devices; incandescent lamp impact tests; and flasher test equipment. New, technically revised, or editorially changed entries are indicated. A numerical index is provided.

Society of Automotive Engineers, 400 Commonwealth Drive,
Warrendale, Pa. 15096
Rept. No. SAE-HS-34 ; 1979 ; 84p refs
Availability: SAE

HS-026 340

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY

The study attempts to identify by cluster analysis the patterns of alcohol impairment and neuroticism in a sample of men arrested for driving while intoxicated (DWI) in philadelphia, and to differentiate types of offenders according to psychosocial characteristics and drinking histories, suggesting how distinct types of DWI offenders might be treated in the present judicial, educational and clinical framework. Statistical analysis of blood alcohol concerntration at time of arrest, quantity-frequency level of drinking and scores on an impairment index and the N Scale of the Eysenck Personality Inventory differentiated seven types among 1500 men arrested for driving while intoxicated. Treatment regimens for the seven groups are suggested.

by Robert A. Steer; Eric W. Fine; Pascal E. Scoles
Publ: Journal of Studies on Alcohol v40 n3 p222-9 (Mar 1979)
1979 ; 11refs
Availability: See publication

HS-026 341

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT

A lighting system consisting of pavement inset lights to aid motorists during periods of fog was installed on a 5.8-mile (9.4-km) section of I-64, traversing the top of Afton Mountain. Data were collected before and after the lights were installed. Traffic flow parameters were vehicle speeds headways, queues, and lateral placement, and a before and after accident analysis was made. Overall the lighting system led to higher nighttime speeds, an increase in speed differentials for various cases during both day and night, and a decrease in nighttime headways and queuing. Although such changes in traffic flow characteristics might lead to an increase in the potential for accidents, they are considered to be a result of the inset lighting system providing improved delineation for the guidance of motorists, and a system of matrix type fog warning and advisory speed signs is proposed for regulating speeds within the system of guidance lights.

by Frank D. Shepard
Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Rept. No. VHTRC-78-*R25 ; 1977 ; 29p 2refs
Prepared in cooperation with Federal Hwy. Administration.
Availability: Corporate author

HS-026 342

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS

The Dept. of Commerce (DOC), after analyzing the fuel economy standards proposed by the Dept. of Transportation (DOT), concludes that the goal of 27.5 mpg by 1935 is feasible, but prefers an alternative method of implementation. DOT proposes "front-loaded" standards: more rapid increases in mpg required during the early years of the program than in later years; the DOC recommends a straight-line approach requiring equal annual mpg improvements. Reasons for this preference include cost effectiveness of the straight-line approach as opposed to the cost of the front-load standard, an adequate margin for error in view of the technological and economic uncertainties involved; the increased regulatory burden faced by the auto industry through the mid-1980's in complying with more stringent emission and safety regulations and fuel economy standards, for which the straight-line approach would provided more flexibility. Savings to the auto buying public by switching from the front-loaded to a straight-line standard are estimated to be approximately $2 billion, in 1978 dollars.

Department of Commerce
1979 ; 29p
Availability: Corporate author

HS-026 343

MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT

A two-year study examined some of the basic problems involved in improving the design of active warning devices intended to make motorists more aware of grade crossing hazards. Emphasis was placed on the improvement of the attention-getting aspect (conspicuity) of active crossing warning devices which was presumed to correlate positively with improvements in grade crossing safety. Following a literature survey, an indoor laboratory test was conducted in the Federal Aviation Administration Low Visibility Res. Facility. More than 150 subjects gave over 20,000 responses to flashing light displays. Results were anlayzed to determine effects of color, flash rate, brightness, size, and placement under daylight, darkness, and daytime fog conditions. The laboratory tests resulted in development of two improved devices which were field tests on actual grade crossings. The first device consisted of an array of three eight-inch, white (clear) strobe lights added to a standard flashing warning system at a high accident rate urban crossing in Richmon, Calif. The second device was added to a gate arm and consisted of three small strobes, colored red, white (clear), and blue, installed at a rural highway grade crossing with high-speed truck and automobile traffic. Due to project restraints, no long-term safety improvement analysis could be conducted. Because there was no evidence of driver confusion during the conduct of these field tests, it is concluded that colored lights other than red can be used in moderation as add-on to existing active cross warning devices to increase conspicuity. The high composite (not from a single source) flash-rate devices that were installed did not result in any erratic driving behavior of approaching motorists. (Appended are an annotated bibliography (divided into subject categories) and discussions of visual perception, statistical procedures, and raw data (procedures) results (including tabulated summary).

by R.J. Ruden; C.F. Wasser; S. Hulbert; A. Burg
MEAssociates, P.O. Box 196, San Ramon, Calif. 94583
DOT-FH-11-8846
Rept. No. FHWA-RD-77-167; MB-*R-77/72 ; 1977 ; 274p refs
Rept. for Jul 1975-Aug 1977.
Availability: NTIS

HS-026 344

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS

In Apr 1978, Australia's Office of Road Safety conducted a national press and radio publicity campaign aimed at increasing the fitting and use by children of conventional seat belts where child restraints were not available, and relocating children, particularly those unrestrained, from front to rear seats. Undertaken in states with and without child restraint legislation, the effect of the campaign was evaluated using data from roadside observations of restraint fitting and use. Although the campaign was not effective in achieving the desired changes, it did provide valuable data on the transport of children in cars. It was found that over one-third of children have no form of restraint available in the seating position they occupy; only one-fifth to one-quarter of children have a child restraint available, and about one-quarter of these are unapproved. The usage rate is between one-quarter and one-third of all children; about half of the children with an available restraint use it; where child restraints are fitted, usage rate is high (about 90%). The majority of children ride in the rear seat, with 10% to 15% riding in the front seat in Victoria, where unrestrained children are prohibited in the front seat, and around 25% to 30% in South Australia and Western Australia where there is no such prohibition. A copy of the safety campaign press advertisement is appended.

by C.J. Boughton; I.R. Johnston
Department of Transport, Office of Road Safety, Australia
Rept. No. SAE-790075 ; 1979 ; 19p 8refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 345

TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS

A distillation of papers on transportation for the elderly and handicapped includes presentations from a national perspective, a brief history of the major Federal legislation affecting transportation programs for elderly and handicapped persons, one desabled individual's opinion on barrier-free transportation, discussions of planning and implementation methods, examples of state (California, Oregon, Pennsylvania, Georgia, Tennessee), rural (Iowa, South Carolina), and urban (Louisville, Atlanta, Montgomery, Dade County (Fla.), Evanston (Ill.), San Antonio, Spokane) programs, and discussion of driver training and equipment selection. The authors include staff representatives from both the House and Senate Committees on Aging; other Federal officials; advocates from the transit industry, the user groups, and the nonprofit social agencies; planners and consultants who have developed model methodologies; state and local program managers; and legal experts. A glossary is provided, defining possibly unfamiliar terms and abbreviations used by the authors, as well as a list of the authors and their addresses and phone numbers. This report is a companion to an annotated bibliography, "Transportation and the Elderly and Handicapped: A Literature Capsule" (Jan 1977).

Transportation Systems Center, Technology Sharing Prog. Office, Kendall Square, Cambridge, Mass. 02142
1978 ; 154p refs
Dept. of Transportation technology Sharing Prog. Abridged versions of papers presented at 6th Annual Conference on Transportation for the Elderly and Handicapped, Tallahassee, Fla., Dec 1977, sponsored by Florida State Univ.
Availability: Corporate author

HS-026 346

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT

In Jan 1976, the Dept. of Transportation issued Technical Notice DOTT-1-76 requesting transportation planners, engineers, and transit operators to submit useful but not widely known manual techniques that could be developed and distributed as simplified aids for transportation analysis. An annotated summary is presented of each of the more than 70 analytical aids that were submitted. For each case, a brief description of the aid is provided, the submitting person or agency is identified, and, in many cases, a reference document is suggested which describes the technique and/or its application. The descriptions are intended to assist the transportation analyst in determining which of the aids might be useful in a particular local application. The aids, presented alphabetically by source, are described in the following functional categories: planning, evaluation, and design for conventional bus and transit and paratransit; planning, evaluation, and design for express bus and rail transit; transit route monitoring and evaluation; sketch planning analysis; trip generation analysis; land use planning and activity allocation analysis; economic analysis; parking analysis; environmental analysis; and miscellaneous functions, such as traffic safety, traffic operations, intercity travel, and air travel.

Pest, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-UT-50021
Rept. No. UMTA-IT-06-9020-79-1 ; 1979 ; 112p refs
See also HS-026 347--HS-026 351.
Availability: NTIS

HS-026 347

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT

As one of a collection of useful but not widely known manual techniques employed by local transportation planners, engineers, or transit operators, a method is described for deriving an important socioeconomic variable in travel demand estimation, namely, automobile availability per household. This variable was found to be a function of two other variables: the average market price of homes, and the percent of home ownership. Local data at the level of detail required for transportation demand analyses (e.g. transportation planning zone, traffic zone, or census block) is generally more readily available for these factors. The analytical aid, required data and information, application procedure, and analysis output are outlined in an introductory section. The results of a research project are presented which determined the functional relation used to estimate automobile availability per household, and a method is provided for developing a similar function using local data. Two examples of travel demand models (trip generation, model split) using the variable are presented. Shortcomings and limitations of the analytical aid are addressed.

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-UT-50021
Rept. No. UMTA-IT-06-9020-79-2 ; 1979 ; 35p 6refs
Based on original work by Michael Holoszyc and Dale Miller, Princeton Univ. See also HS-026 346, and HS-026 348--HS-026 351.
Availability: NTIS

HS-026 348

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT

As one of a collection of useful but not widely known manual techniques employed by local transportation planners, engineers, or transit operators, a simple method is presented for estimating the annual ridership and operating expenses of fixed-route bus system alternatives in urban areas with populations of less than 300,000. The method is based on regression equations generated principally from 1974 operating data for 55 U.S. fixed-route bus systems. These equations can be used to develop preliminary estimates of the annual ridership and public financial operating assistance required for such systems in small, urban areas. The equations can be solved using a hand calculator and readily available data inputs. The analytical aid, required data and information, and analysis output are outlined in an introduction section. The estimation equations are described, and their use illustrated. Shortcomings and limitations of the analytical aid are addressed.

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-UT-50021
Rept. No. UMTA-IT-06-9020-79-3 ; 1979 ; 29p 7refs
Based on original work by john Collura, North Carolina Dept. of Transportation. See also HS-026 346, HS-026 347, and HS-026 349--HS-026 351.
Availability: NTIS

HS-026 349

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT

As one of a collection of useful but not widely known manual techniques employed by local transportation planners, engineers, or transit operators, a method is presented for evaluating individual transit routes for a fixed-route, fixed-schedule urban transit system. Individual transit system routes are evaluated semiannually, based on a comparison of nine performance factors with established route standards set for each factor. These factors are average revenue passengers per month, average monthly passenger growth, percent growth per month, total passengers per trip, average capacity utilization factor, percent transfers, operating revenue per mile, operating revenue per hour, and net operating cost per passenger. Input data used in the evaluation are recorded semiannually and scores computed for each of the performance factors for each route according to an evaluation score algorithm. Scores are then added for each route, and routes ranked by their total evaluation score. Results are used as the basis for route refinement and modification decisions. The procedure is best applied to systems whose overall ridership is growing. The analytical aid, required input data, and application procedure are outlined in an introductory section. detailed instructions for conducting a transit route evaluation, and an example to illustrate the procedure and its output arte provided. Shortcomings and limitations of the analytical aid are addressed, including ways to modify it to suit individual user needs. Appended is a list of the analytical variables, including their definitions, notations, and derivations.

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-UT-50021
Rept. No. UMTA-IT-06-9020-79-4 ; 1979 ; 37p 6regs
Based on original work by John Whittington, San Diego Transit Corp. See also HS-026 346--HS-026348, HS-026 350, and HS-026 351.
Availability: NTIS

HS-026 350

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT

As one of a collection of useful but not widely known manual techniques employed by local transportation planners, engineers, or transit operators, a method is presented for estimating the accumulation of parked vehicles within a study area on a typical weekday. Parking accumulation and utilization of parking facilities may be estimated for all parkers, long-term, and/or short-term, based on an estimate of daily automobile trip destinations, an inventory of available parking supply, and a set of parking "accumulation factors" (which may be derived from a parking survey within the study area or from default values which are provided). The primary use of the method is to analyze the adequacy of available parking supply in relation to expected parking demand. The method may also be used to monitor and suggest revisions to automobile travel impedance values used in transportation planning models. The analytical aid, required input data and information, application procedure, and analysis output are outlined in an introductory section. A detailed description of the data and information required and the most likely data sources are provided. The step-by-step procedures for calculating parking accumulation, determining the utilization of existing or planned parking facilities, and estimating the required new or additional parking spaces are described. The analysis procedure is illustrated with a hypothetical case study. Shortcomings and limitations of the analytical aid are addressed. Appended is a description of the derivation of the accumulation factors.

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-UT-50021
Rept. No. UTMA-IT-06-9020-79-5 ; 1979 ; 47p 13refs
See also HS-026 346--HS-026 349, and HS-026 351.
Availability: NTIS

HS-026 351

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT

As one of a collection of useful but not widely known manual techniques employed by local transportation planners, engineers, or transit operators, a method is presented for identifying candidate sites for change-of-mode fringe parking facilities, for estimating specific parking facility requirements at these candidate sites, and highway access requirements. The analytical aid, required data and information, and analysis output are outlined in an introductory section. criteria for use in identifying candidate change-of-mode sites are suggested, a qualitative analysis method is described, with input data required to perform preliminary screening of the sites and to select those sites which warrant further analysis. A five-step quantitative procedure is described for use in determining parking space requirements for candidate sites; the procedure involves delineating origin and destination market influence areas for each site and identifying the transportation zones which make up each influence area; estimating total daily person trip interchanges between origin and destination market influence areas; estimating the proportion of each trip interchange that will use the line-haul mode (commuter railroad, rapid transit, or express bus); estimating the proportion of daily line-haul riders that will use the change-of-mode fringe parking facility; and calculating the new or additional parking facilities required at each site. A method for estimating highway access requirements for candidate sites is provided, and a format for preparing an evaluation profile of the sites is presented. Shortcomings and limitations of the analytical aid are addressed.

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-UT-50021
Rept. No. UMTA-IT-06-9020-70-6 ; 1979 ; 64p 17refs
Based on original work by Charles Dougherty, Lawrence S. Golfin, and Rasin K. Mufti, Delaware Valley Regional Planning Commission. See also HS-026 346--HS-026 350.
Availability: NTIS

HS-026 352

TURBOCHARGERS AND TURBOCHARGED ENGINES

Following an overview of the automotive turbocharger, 12 papers are compiled on turbochargers and turbocharged engines. Papers on turbocharged engines cover the following topics: turbocharging small-displacement, spark ignition engines for improved fuel economy, installation and design problems associated with the automotive turbochanger turbocharging four-cycle diesel engines, turbocharger compressor performance evaluation and critical flow field measurements, and exhaust emissions from a European light-duty turbocharged diesel. Papers on "turbochargers in the 80's" cover the following topics: current trends and future prospects for turbochargers in the 1980's, variable-area turbocharger for high-output diesel engines; the effect of compressor and turbine specific speed on turbocharger efficiency and engine performance; centrifugal compressor development for a variable-area turbocharger; series turbocharging--a requirement for high specific output vehicular diesel engines; estimting the influence of pulsating flow conditions on the performance of a turbine; and Helmholtz-tuned induction system for turbocharged diesel engine.

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-442 ; 1979 ; 149p refs
Includes HS-026 353--HS-026 364. Papers presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 353

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY

An approach is described for improving fuel economy by using turbocharged, spark ignition engines of relatively small displacement, 1.6 L, 4-cylinder and 2.2 L, 5-cylinder, to replace larger, naturally aspirated engines of the same power potential. A low-flow turbocharger is used to realize a given peak performance with good power characteristics over the entire engine speed range. The boost pressure is controlled by a wastegate. The air-fuel mixture is prepared by a two-stage carburetor at the intake of the turbocharger compressor. The oxygen concentration in the exhaust gas is measured by an oxygen sensor upstream of a three-way catalyst. A detailed description is given of the turbocharger installation, charge pressure control, and air-fuel mixture control. A system for the stabilization of engine speed at idle with simultaneous increase of exhaust gas temperature is described. The effects of the compression ratio on fuel economy in the Urban Driving Cycle (UDC) are discussed. Preliminary emission and fuel economy test results are presented for the 4-cylinder engine. UDC emissions for the 3000-lb vehicle with 1.6 L engine were 0.19 g/mi HC (hydrocarbon), 3.27 g/mi CO (carbon monoxide), and 0.71 g/mi NOX (nitrogen oxides); Highway Driving Cycle (HDC) emissions were 0.01 g/mi, 0.91 g/mi, and 0.78 g/mi, respectively, for HC, CO, and NOX. Further work is needed in tuning the carburetor feedback system and in exhaust gas aftertreatment to meet emission goals. Fuel economy results were 43 mpg HDC and 26 mpg UDC.

by K.-D. Emmenthal; G. Hagemann; W.-H. Hucho
Volkswagenwerk A.G., Wolfsburg, Germany
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, pa., 1979 P1-8
Rept. No. SAE- 790311 ; 1979 ; 8refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 354

INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER

The Schwitzer S6 automotive turbocharger was designed with the philosophy of severe economic guidelines and mounting versatility. In order to meet the design goals, a number of unique items had to be considered and incorporated in the turbocharger. The current design can be mounted from within 4 degree of horizontal to within 10 degree of vertical. The bearing housing is sandwiched between the compressor end flange plate and the turbine housing, with retention by three cross bolts located at 120 degree intervals. This arrangement allows the gravity oil drain to be rotated within the intervals between the bolts. The bearing system was simplified by using a free-floating, nonrotatable sleeve bearing with axial thrust capability to replace the Schwitzer rotating journal with a separate thrust bearing. The wastegate system is comprised of a rotary valve actuated by a remote boost-controlled, spring-loaded diaphragm. This concept allows the turbine to be bypassed to avoid any increase in engine back pressure as a result of the presence of the turbocharger at high cruising speeds. The rotary valve also has the advantage of a positive self-cleaning feature and requires less close tolerance machining than a more conventional pop-off valve arrangement. The control mechanism for the wastegate is located remote from the turbine housing, which allows the use of less expensive, less corrosion-resistant parts.

by Kenneth F. Kaiser; Charles R. Sarle; Bruce R. Owen
Wallace Murray Corp., Schwitzer Div., Indianapolis, Ind.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p9-23
Rept. No. SAE-790313 ; 1979 ; 3refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 355

TURBOCHARGING FOUR-CYCLE DIESEL ENGINES

The interaction of turbocharger characteristics with engine design and performance parameters is discussed. The matching of a turbocharger to an engine configuration by the choice of turbomachinery components is a very complex mix of performance and mechanical compromises. A variety of factors must be considered, each of which has an impact on all aspects of the overall package performance. Air-fuel ratios must be adjusted in order to optimize the engine combustion system performance. Firing pressures must be controlled to stay within the accepted boundaries for mechanical stresses in the hardware. The firing pressure limit controls the amount of turbine work that can be extracted in a given situation. These combined limits then control the transient response and torque peak-speed output. They also provide a limit to the torque rise attainable. The turbocharged engine characteristics are an interactive combination of the engine combustion system and mechanical design constraints and turbocharger characteristics. A series of tradeoffs must be optimized if the designer is going to achieve an overall acceptable performance for the system. In order to relieve some of the significant constraints on the system, efforts in turbomachinery design must concentrate on developing efficient, broad-range compressors which are driven by efficient, responsive, variable-geometry turbines.

by Patrick F. Flynn
Cummins Engine Co.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p25-37
Rept. No. SAE-790314 ; 1979 ; 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 356

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS

A detailed study of two commercial turbocharger compressor impellers (full-blade, and partial-blade or cutback) with a parallel-wall, vaneless diffuser was carried out to expand understanding of current turbocharger test procedures and to lay the groundwork for an "industrially useable" method to assess discharge conditions from radial turbomachinery rotors. The study demonstrated that present turbocharger compressor maps from different sources cannot be reliably compared because random errors can amount to plus/minus 0.05 (5 points) on efficiency (20:1 odds). Common sources of random error include uncalibrated thermocouples, stem errors, improperly formed pressure taps, and transducer and electronic processing errors. For the particular impellers and vaneless diffusers tested, a diffuser flow field was found for which the flow followed the diffuser rear (hub) surface at impeller discharge with backflow at the shroud; the pattern reversed midway through the diffuser with attachment along the front (shroud) and with reverse flow along the back wall (hub). The traverses were invaluable in deducing the flow field structure. Although the quantitative diffuser results were useful in providing upper and lower data bounds on basic parameters heretofore deduced (slip factor, backflow loss, rotor efficiency, diffuser recovery), difficult probe/measurement questions must be resolved before quantitatively precise results will be obtained. The full-blade impeller plus diffuser appeared to be slightly superior to the partial-blade impeller plus diffuser.

by David Japikse; Jay Goebel
Creare Inc., Hanover, N.H.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p39-58
Rept. No. SAE-790315 ; 1979 ; 10refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 357

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL

The impact of turbocharging on diesel exhaust emissions was investigated by studying a 4-cylinder, indirect injection (IDI) Fiat engine with different configurations (fuel injection optimization, exhaust gas recirculation (EGR), oxidation catalyst, turbocharging). Experimental results obtained during bench and chassis dynamometer tests were compared with the results from the same tests performed in the naturally aspirated (NA) 4-cylinder engine. Mathematical models were used in order to identify the regions maximally contributing to regulated emissions of HC (hydrocarbons), CO. (carbon monoxide), NOX (nitrogen oxides). Particulate and organic, adsorbed compounds were also measured. For a 3000-lb vehicle, it is concluded that emission targets equal to 0.41 g/mi HC, 3.4 g/mi CO, 2 g/mi NOX, and .7 g/mi particulate are achievable with the NA, IDI diesel engine; EGR is useful in lowering NOX (to less than 1.5 g/mi), but increases particulate emissions. Oxidation catalyst appears to offer levels of 0.41 g/mi HC, 3.4 g/mi CO, and 1.5 g/mi NOX with a particulate level of 0.7 g/mi, if a diesel fuel with low sulfur content is used. Turbocharging appears to be a good approach to achieve low gaseous emission levels of 0.41 g/mi HC, 3.4 g/mi CO, and 1.5 g/mi NOX with lower particulate emissions (less than 0.4 g/mi) CO, and 1.5 g/mi NOX are reasonable achievable with particulates less than 0.6 g/mi. Turbocharging plus EGR plus oxidation catalyst permit these same figures to be achieved more easily if a diesel fuel with low sulfur content is used, and also decrease the organic emissions.

by C. Bassoli; G. M. Cornetti; G. Biaggini; A. Di Lorenzo
Fiat Res. Centre, Turin, Italy; IVECO Engineering, Turin, Italy; C.N.R., Combustion Res. Lab., Naples, Italy
DOT-TSC-1424
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p59-77
Rept. No. SAE-790316 ; 1979 ; 11refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 358

TURBOCHARGERS FOR THE 1980'S--CURRENT TRENDS AND FUTURE PROSPECTS

The requirements placed on turbocharging systems in the very different applications of automobiles (gasoline and diesel), trucks, and off-highway vehicles are reviewed. The developments that will be required in the 1980's are highlighted, together with an analysis of current limitations and future potential. Prospective developments relate not just to turbocharging, but to matching, system design, and maximizing exhaust gas energy utilization. For the near future, development on trucks and off-highway vehicles at modest ratings will continue, with emphasis on wide flow-range compressors, efforts to increase low-speed boost, and better detail design of port and manifold systems. In the near future, the number of turbocharged gasoline engines will increase, although long-term success depends on their comparative cost-effectiveness as a fuel economy measure; this is likely to require a major breakthrough in production costs. The ceramic, variable-geometry turbine is the ideal for this application, if it can be developed to achieve reliability at low cost. More certain is the route of small turbocharger applications to passenger car diesel engines, particularly in Europe; these can benefit from developments aimed at the gasoline engine. In the U.S., stringent exhaust emission legislation is offset by the economies of larger production runs on each engine build. The high break mean effective pressure engine also presents problems to the turbocharger manufactures; high-pressure ratio turbomachinery is required with wide flow range, good efficiency, and durability. Problems encountered with such single-stage turbocharging such as inadequate low-speed torque, poor driveability, and matching for operation at altitude, may be avoided by introducing two-stage systems. In all applications, more emphasis is expected on detail design of all components in the total turbocharging system, including valves, ports, manifolds, and exhaust systems, as well as the turbocharger itself.

by N. Watson
Imperial Coll. of Science and Technology, Dept. of Mechanical Engineering, London, England
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p81-96
Rept. No. SAE-790063 ; 1979 ; 23refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 359

VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES

A program was undertaken to develop, build, and test an advanced turbocharger on the AVCR-1360 air-cooled diesel tank engine for the Army, by Teledyne Continental Motors, and Thermo Mechanical Systems. High-output, turbocharged diesel engines require efficient air-delivery systems with high pressure ratio, broad range, and surge-free compressors of very high efficiency, as well as high-efficiency turbines with variable stators, in order to maintain high turbine speed when engine speed and airflow are low. The turbocharger developed to meet these goals has a backswept centrifugal compressor with a wedge-type moveable vane diffuser for surge control and a radial inflow turbine with individually pivoted nozzle vanes for inlet flow-area control. After several design iterations and bench tests, extensive engine tests were conducted to demonstrate the substantial improvements in diesel engine performance that are attainable with these turbochargers. A peak engine torque of 3650 ft lb (4949 Nm) has been demonstrated by the AVCR-1360 engine equipped with variable-area turbocharger (VAT), compared to peak torque of 3120 ft lb (4230 Nm) for the base engine. The target torque rise at 1600 rpm of 20% above the rated 3050 ft lb (4135 Nm) has been achieved. The system has the capability of running at the full-speed rated torque at 50% engine speed. The VAT-EQUIPPED engine has a peak of 1660 gross brake hp (1228 Kw) at the rated 2600 rpm vs. 1500 (1110 Kw) for the base engine. Brake specific fuel consumption (BSFC) at the rated point has been demonstrated at .390 lb/GBHP-HR (237.2 g/Kw hr), about a 10% improve 5% improvement. Steady-state smoke observations indicate substantial smoke reduction. VAT durability has been demonstrated to a limited degree (about 700 hr of turbocharger operation without major failures).

by S. G. Berenyi; C. J. Raffa
Teledyne Continental Motors, General Products Div., Muskegon, Mich.; Army Tank Automotive Res. and Devel. Command, Warren, Mich.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p97-112
Rept. No. SAE-790064 ; 1979 ; 5refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by Army Tank Automotive Res. and Devel. Command. See also HS-026 361.
Availability: In HS-026 352

HS-026 360

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE

In a technique for optimizing turbocharger design, calculations demonstrate the effect of decreasing turbocharger component specific speeds on overall turbocharger efficiency. It is concluded that an overall turbocharger efficiency greater than 70% is obtainable for low specific-speed compressors and turbines, an improvement of at least ten points above the overall turbocharger efficiency of the best of current machines and 15 points above more typical modern designs. Since two points improvement in overall turbocharger efficiency corresponds to approximately one point in engine efficiency, an improvement in engine efficiency or specific fuel consumption in the order of five to seven points appears possible. The price of large, low specific-speed turbochargers for vehicular diesel engines is not known since vehicular turbochargers of this size have not been built. Larger turbochargers will present installation problems in many vehicular applications, and their rotary inertia will be greater than current designs. Although this will have an effect on the transient performance of the turbochargers, the decrease in transient performance may be reduced by the improvement in component efficiency.

by Wilbur Allan Spraker, Jr.; Cheng-Chien Chou
Wallace Murray Corp., Schwitzer Div., Indianapolis, Ind.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and Turbocharged Engines," Warrendale, Pa., 1979 p113-8
Rept. No. SAE-790065 ; 1979 ; 10refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 352

HS-026 361

CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER

A variable-geometry diffuser was developed for a centrifugal compressor with the objective of meeting the surge regulation and airflow requirement of the Army's advanced AVCR-1360 air-cooled diesel tank engine. The program involved the combined design and development activities of Teledyne Continental Motors (General Products Div.), Power Dynetics, Inc., and Thermo Mechanical Systems. Two types of compressor rotors were built and tested (a radial-blade impeller and a backswept impeller). Results of the performance test program indicated that the variable-geometry compressor met the range and efficiency goals over most of the required operating conditions. The backswept impeller was found to be superior to the radial-blade impeller over the entire operating map. Compressor efficiencies as high as 80% were demonstrated in the high airflow operating regime (rated engine speed). At very low airflows corresponding to the lowest engine speed operation, the onset of impeller stalling caused an efficiency loss. It is believed that the complexity of variable geometry is justified where maximum efficiency and range are mandatory. Continued development of the variable-diffuser, backswept compressor is necessary to upgrade the efficiency at the engine idle speed condition (1000 rpm). Such a development program should include inlet and impeller geometry changes, diffuser system refinements, and turbocharger modifications designed to increase the design specific speed of the variable-area turbocharger.

by James L. Harp; Thomas P. Oatway
Thermo Mechanical Systems Co., Canoga Park, Calif.;
Lockheed California Co., Burbank, Calif.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and
Turbocharged Engines," Warrendale, Pa., 1979 p119-27
Rept. No. SAE-790066 ; 1979 ; 3refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar
1979. Research sponsored by Army Tank Automotive Res. and
Devel. Command. See also HS-026 359.
Availability: In HS-026 352

HS-026 362

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES

In view of the problems associated with obtaining broad compressor range and efficiency at high pressure ratio and the ever-present requirements for durable, low-cost, and low-inertia turbochargers, the performance benefits derived from series (two-stage) turbocharging as applied to high-speed vehicular diesel engine applications are examined. The efficiency, compressor range, transient response, and pressure ratio characteristics of series turbocharging are compared and contrasted to those of single-stage turbochargers. This comparison is fundamental because, in the size class of interest, no high pressure ratio turbochargers are currently in production. It is concluded that it is practical to use existing vehicular tubocharger technology to satisfy, at least in the near term, the demand for higher pressure ratio turbocharger capability. The present-day turbocharger, in volume production, can supply the building blocks for series turbocharger systems.

by Keith G. Rochford
Garrett Corp., AiResearch Industrial Div.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and
Turbocharged Engines," Warrendale, Pa., 1979 p129-33
Rept. No. SAE-790067 ; 1979 ; 6refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar
1979.
Availability: In HS-026 352

HS-026 363

ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE

A new method of estimating turbine performance under nonsteady flow conditions is described, based on the concept of "mean effective turbine expansion ratio" (m.e.t.e.r). The m.e.t.e.r concept is defined as that average expansion ratio which, when assumed to exist across a turbine working under nonsteady flow conditions, gives the "actual" turbine power, with other parameter values being time average values and the isentropic efficiency being a function of this average expansion ratio. A digital computer program to evaluate the "pulse factor" is presented; the pulse factor is evaluated to predict the turbine performance under nonsteady flow conditions when the performance under steady flow is known. This factor takes into account the variations in expansion ratio, mass flow rate, turbine inlet temperature, and turbine nominal efficiency due to nonsteady flow and is a linear function of mass flow parameter for a constant pulse frequency. The estimation method has been used successfully in real-time digital, hybrid, and analog computer simulations for predicting transient performance of a turbocharged diesel engine. Good agreement was found between predicted and test-bed results.

by S. S. Shamsi
Pakistan State Oil Co., Ltd., Karachi, Pakistan
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and
Turbocharged Engines," Warrendale, Pa., 1979 p135-8
Rept. No. SAE-790068 ; 1979 ; 7refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar
1979.
Availability: In HS-026 352

HS-026 364

HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE

A tuned intake induction system using a Helmholtz resonator was applied to an in-line, 6-cylinder, 4-cycle, heavy-duty diesel engine, the system being designed to minimize the engine breathing performance at the peak torque engine speed. Significant advantages of this system were 12% improvement in volumetric efficiency, improved cylinder-to-cylinder air distribution, and faster turbocharger response. The increased trapped air-fuel ratio also resulted in improved combustion efficiency and reduction of smoke emissions. Additional improvements appear feasible by compressor redesign and optimization of valve timing. The primary disadvantages are the additional space requirement and corresponding installation difficulties, but compact designs can be achieved without great difficulty. The tuned intake resonator offers a means of improving the engine airflow characteristics by economical means. It performs this function without undue system complexity, moving parts, or the need for a control system. These attributes make its incorporation possible without compromising the reliability or durability of the powerplant.

by M. C. Brands
Cummins Engine Co.
Publ: HS-026 352 (SAE-SP-442), "Turbochargers and
Turbocharged Engines," Warrendale, Pa., 1979 p139-47
Rept. No. SAE-790069 ; 1979 ; 4refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar
1979.
Availability: In HS-026 352

HS-026 365

SILENCER DEVELOPMENT AT TI CHESWICK SILENCERS [MUFFLERS]

Development approach, activities, and test facilities for exhaust systems at TI Cheswick, a British firm, are described. The general approach to muffler development is one of allowing the exhaust gases to expand into chambers of large cross-sectional area. Expansion of the relatively low frequency wave fronts, successively, into volumes adding up to one-third capacity (use of expansion chambers) is general practice. "Roughness" following in the wake of the wave front is reduced by use of louvered tubes within closed portions of the muffler; these tubes act as Helmholtz resonators to attenuate the high frequencies. One peak frequency in the combustion exhaust spectrum, called "boom", is often dealt with by a separate Helmholtz resonator. Gas-induced noise such as "pipe noise", case rattle, and plate vibration are usually overcome by such measures as laminated pipes, damped end-plates, increased number of bulkheads, and insulated case structures, while "overrun rasp" is normally treated with a resonator within 1070 mm (42 in) of the exhaust ports, or by passing the gas through an "absorption chamber" prior to expansion. TI Cheswick is also involved in the production canning of catalytic converters and in the development and testing of other promising pollution control devices. Latest systems are three-way catalytic converters; for the 1980 model year, oxygen sensors are to fitted, with electronic computer control of the engine air-fuel ratio. New systems are tested on thermal cycyling and thermal vibration rigs, with successful designs proceeding to engine dynamometer and on-car trials. Current units are made on company-designed, special-purpose machines. Parallel development work has been carried out on "lean burn" thermal reactors designed to replace conventional exhaust manifolds. The company, jointly with Texaco and Associated Octel, has developed a lead particulate filter for reducing lead emissions, and is developing a diesel particulate filter.

Publ: Automotive Engineer v4 n2 p43-5 (Apr-May 1979)
1979 ; 2refs
Availability: See publication

HS-026 366

HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS

In an Environmental Protection Agency program over the past several years, particulate emissions have been measured from a variety of heavy-duty diesel engines. Samples have been collected by Southwest Res. Inst. using an exhaust splitter to divert a fraction of the engine exhaust into a standard dilution tunnel. A small fraction of the diluted exhaust from the tunnel is pulled through a filter from which particulate mass and, in some cases, organic content of the particulate is determined. The sampling system is discussed, and particulate emission factors are given that have been computed from truck and bus fuel consumption data. Average truck and bus speed data from New York and Los Angeles (freeway and nonfreeway usage) are also provided. Average particulate emission test results (steady-state tests) for 2-stroke engines are 4.74 g/kg fuel, and 2.64 g/kg fuel for 4-stroke engines. Using average particulate emissions results, a particulate emission factor range of 0.8 g/km to 1.3 g/km was computed. Nationwide diesel particulate emissions were calculated to be 88,170 metric tons per year (79,850 for trucks, 2750 for intercity buses, and 5570 for local buses).

by Thomas M. Baines; Joseph H. Somers; Craig A. Harvey
Publ: Journal of the Air Pollution Control Association v29 n6 p616-21 (Jun 1979)
1979 ; 18refs
Revised version of paper (No. 78-54.3) presented at 71st Annual Meeting of Air Pollution Control Assoc., Houston, Jun 1978.
Availability: See publication

HS-026 367

FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT

In the first year of a planned three-year program, the research efforts were focused principally on the development of an automated vehicle test facility which would be employed to study control and communication problems at, and below, the sector level. These studies would be focused on the automatic control of high-speed (to 28.1 m/sec), traffic operations at time headways as small as one sec. The primary activities included the implantation of both lateral and longitudinal information sources at the 6.4-km, skid-pad facility at the Transportation Research Center of Ohio; the specification of a sector-level controller which would be comprised of a commercially available microprocessor and a considerable amount of special-purpose hardware; a study of automatic longitudinal control, both in the normative and emergency modes of operation; the evaluation of a "flattened" helical-line information source for providing continuous position information to each controlled vehicle in a sector; and a study of automatic steering with an emphasis on high-speed, lane-changing operations. Details are presented of the first, third, and fourth activities; the other two will be discussed in two forthcoming papers. The secondary activities included a reevaluation of a headway safety policy for automated highway operations, and the development of a methodology to determine the accident costs associated with a particular policy choice.

by R. E. Fenton; R. J. Mayhan; G. M. Takaski; J. Glimm
Ohio State Univ., Transportation Control Lab., Columbus, Ohio 43210
DOT-FH-11-9257
Rept. No. FHWA-RD-79-42; 784712-1 ; 1978 ; 200p 57refs
Rept. for Apr 1977-Apr 1978.
Availability: NTIS

HS-026 368

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]

Although most states participate in the National Driver Register (NDR) to some degree, four states (California, Florida, Massachusetts, and New York) issue about 25% of the driver's licenses in the U.S. with little or no prior use of the NDR. The NDR is a voluntary, cooperative Federal-state project providing a source of data which states can utilize to determine if persons applying for or renewing driver's licenses have had their driving privileges suspended or revoked in other jurisdictions. State laws prohibit issuing a license to a person while his license is withdrawn in another jurisdiction. Failure to use the Register raises the question whether the states are liable for damages if a driver who should not have been licensed is involved in a crash. A review is given of the reasons offered by the aforementioned states for not making full use of the NDR, and a commentary provided on the potential liability of these states.

by Andrew R. Hricko
Publ: Federation of Insurance Counsel Quarterly v29 n2 p175-84 (Winter 1979)
1979 ; refs
Reprinted and distributed by Insurance Inst. for Hwy. Safety, Watergate 600, Washington, D.C. 20037
Availability: See publication; Insurance Inst. for Hwy. Safety

HS-026 369

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT

Passenger car braking regulations promulgated by the United States and various European countries were analyzed to determine the incompatibilities in brake proportioning that derive from the performance requirements of the regulations. Two vehicles were considered, one produced in the U.S. and the other in Europe, with extreme loading conditions (as derived from option selection and vehicle loading). The analysis shows that the European regulations (United Nations Economic Commission for Europe Regulation 13, Common Market European Economic Community Directive 71/320, Swedish regulation F-18) require a larger forward bias in brake proportioning than FMVSS (Federal Motor Vehicle Safety Standard) 105-75. Computer simulations were used to predict the following differences in braking performance which result from proportioning the example vehicles to comply with the different regulations: conditions of straight-line braking, braking in a turn, and three surface friction levels. In general, both vehicles were capable of achieving shorter stopping distances when proportioned to meet FMVSS 105-75 than when proportioned to comply with the European regulations, but the differences are considered trivial with respect to the ordinary driver. When proportioned to meet FMVSS 105-75, the rear wheels of the two study cars sometimes locked up first, a result that the European regulations are designed to prevent. Braking-in-a-turn test procedures (which have been discussed both in the U.S. and aboroad) were also studied through computer simulations and found to be relatively insensitive to the fore-aft proportioning of brake torques.

by M. Sayers; L. Segel
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-78-51; PB-291 748 ; 1978 ; 155p 27refs
Rept. for 1 Jul 1977-31 Oct 1978. Sponsored by Motor Vehicle Manufacturers Assoc.
Availability: NTIS

HS-026 370

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS

A digital transmission shift schedule control has been developed which measures throttle position and vehicle speed to determine the proper gear ratio based on preprogrammed upshift and downshift schedules. Five- and six-bit vehicle speed and three- and four-bit throttle position resolutions have been evaluated. Throttle position was measured with an experimental variable-reluctance device (variable-frequency oscillator), located above the throttle position; vehicle speed was measured by a magnetic pickup from a toothed wheel on the transmission output shaft. The electronic control system has been evaluated for over 4000 mi under city, highway, sea-level, and high-altitude conditions. It has been demonstrated to be a viable method of scheduling the shift points of a transmission and represents a likely first step in the conversion of transmissions to electronic control. The best compromise resolution for vehicle speed would probably be a five-bit signal with full scale at 85 mph. The same speed signal would be used for 1-2 and 2-3 shift schedule. This would provide approximately 2.7 mph increments for both the 1-2 and 2-3 shift schedules. The best compromise resolution for throttle position would probably be a three-bit nonlinear signal. Every attempt should be made to minimize the number of external wiring connections, as the only durability/reliability problems encountered were with electrical connectors. The control should be integrated with a speedometer display and crusie control, thus eliminating all mechanical vehicle speed measurement.

by G. L. Casey
Bendix corp.
Rept. No. SAE-790044 ; 1979 ; 11p 2refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 371

COIL SPRING SERVICE

Diagnostic and servicing information is provided for the automotive service specialist concerning coil spring components of a suspension system. The design of a suspension system to work around a basic vehicle height, and the effect of sagging coil springs on alignment angles (and thus on tires and handling) are discussed. Badly sagged coil springs must be replaced to restore the car to the original ride height so the wheels can be properly aligned. Tips for measuring vehicle ride height as a diagnostic technique are given. Step-by-step procedures (and accompanying photographs) are provided for servicing coil springs mounted on upper control arms, on lower control arms, on twin axles, and on rear axles. In separate sections, general servicing tips are outlined, and a job cost comparison for a 1974 Chevrolet Impala is made among coil spring servicing, minor engine tuneup, minor brake job, and shock absorber tuneup.

by Ken Zino
Publ: Motor v151 n6 p40-4, 46, 48 (Jun 1979)
1979
At head of title: Motor Clinic Series.
Availability: See publication

HS-026 372

STEP TO THE REAR [REAR AXLE SERVICING]

Information is provided for the automotive service specialist for diagnosing and correcting rear axle assembly problems. Instructions are given for a thorough test of a vehicle in order to isolate the source of the problem noise, and the characteristics of the two general types of rear axle noise (gear and bearing) are described. Step-by-step procedures are outlined for disassembling rear axle assemblies; information is provided for inspecting, reassembling, and making final adjustments. Differences between the two types of axle carriers (integral and removable) are indicated; the different components of the two types are illustrated, as well as their adjustment points. The final road test (the first one having taken place in the diagnostic stage) is described. A rear axle IQ test of 15 questions with multiple-choice answeres is included, and correct answers provided.

by Mike James
Publ: Motor v151 n6 p51-4, 56, 58, 78 (Jun 1979)
1979
Availability: See publication

HS-026 373

CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM]

General Motors has a new emission control system, the Computer Controlled Catalytic Converter (C-4), which is used in California on some 1979 3.8-L V6's, 1980 2.5-L L4's, and 2.8-L V6's. The purpose of the C-4 system is to maintain the air-fuel ratio at the level where the 3-way catalyst is most effective. A bonus of the system is that it prevents the excessively lean mixtures that cause poor driveability. If the C-4 malfunctions, a built-in self-diagnostic system flashes a CHECK ENGINE light on the dashboard. The technician then grounds a trouble code test lead, and a number indicating the problem area flashes. A dwellmeter, ohmmeter, test light, digital voltmeter, tachometer, vacuum gauge, and jumper wires are the only tools needed to diagnose the system. The C-4 will keep a record of anything that goes wrong while the car is in use, and this memory can be queried when the car is brought into the shop. Among the features of the C-4 are an electronic control module, coolant temperature sensor, electronically controlled carburetor, and a distributor advance-retard system.

by Mark Emerton
Publ: Motor v151 n6 p31-2, 35-6, 38 (Jun 1979)
1979
Availability: See publication

HS-026 374

NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE

Cadmium oxide and zinc oxide activated low-sulfur cures and peroxide cures of NBR or poly(butadiene-co-acrylonitrile), with physical properties suitable for use in fuel-line hose tube, were compared with a compount typical of those now used in fuel-line hose to examine their resistance to aging by gasoline containing hydroperoxides ("sour" gasoline). NBR compounded in a conventional fuel hose tube formulation was found to be degraded markedly by sour gasoline or sour ASTM Fuel C within 7 days at 40 degrees C. The conventional NBR compound was not resistant to aging at 125 degrees C. Use of an NBR designed for heat-resistant compounding and an appropriate choice of compound greatly improved resistance to fuel which contained hydroperoxides. The perferred system for sour gasoline resistance and resistance to long-term aging at 125 degrees C is a cadmium-activated, low sulfur-sulfur donor compound with silica as the principal filler. This vulcanizate is not much more affected after 7 days at 40 degrees C by gasoline of peroxide number 50 than by clean gasoline, and is less affected by gasoline of peroxide number 200 than are other NBR vulcanizates. The balance of high- and low-temperature properties can be optimized by appropriate choice of plasticizer and acrylonitrile level. Aging resistance is improved somewhat by increase in acrylonitrile level, and fuel permeability is decreased markedly. Permeability to gasoline with 30 aromatic content can be changed appreciably by compounding, but the resistance to Fuel C with 50% aromatic content does not appear to respond to compounding changes. The stability of NBR vulcanizates in sour gasoline is reduced by copper salts and, to a lesser extent, by metallic copper. Bound antiozidant NBR does not appear to offer an advantage in sour gasoline resistance over heat-resistant NBR compounded in a comparable formulation.

by J. R. Dunn; H. A. Pfisterer; J. J. Ridland
Publ: Rubber Chemistry and Technology v52 n2 p331-52 (May-Jun 1979)
1979 ; 10refs
Presented at meeting of Rubber Div., American Chemical Society, Boston, 10-13 Oct 1978.
Availability: See publication

HS-026 375

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT

The Federal Hwy. Administration method is described for predicting noise generated by constant-speed highway traffic. The report is designed as a users' manual and as a reference document, detailing the development, use, and limitations of the prediction method. The prediction procedure is presented, step-by-step, with example problems for highlighting important concepts and features. Appended is a detailed derivation of the model. The basis of the model is the equivalent sound level (Leq), although an adjustment for conversion to L10 is provided. Three classes of vehicles are included: automobiles, medium trucks, and heavy trucks. Adjustments for absorptive ground covers and finite-length barriers are also included, as are certain special topics, such as nonuniform highway sites and determination of equivalent day-night levels (Ldn).

by T. M. Barry; J. A. Reagan
Federal Hwy. Administration, Washington, D.C. 20590
Rept. No. FHWA-RD-77-108 ; 1978 ; 275p 12refs
Rept. for Jun 1977-Dec 1978.
Availability: NTIS

HS-026 376

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)

Initial experience with a driver improvement program for problem drivers is reported, the program oriented toward changing driver attitude and behavior. The program is based primarily on learning theory and applies such methods as behavioral analysis and self-control techniques. The program consists of four 2- to 2-●-hr sessions with small groups, with individual sessions at the beginning and conclusion of the program. The main topics of the course include the following types of driver impairment; underestimation of the hazardousness of certain traffic offenses, overestimation of one's driving capability, underestimation of the detrimental effects of alcohol, and inappropriate estimation of the consequences of one's behavior. Initial experience in testing the program involved a group of 25 male offenders with an average age of 30, almost all having been involved in alcohol-related accidents involving personal injury. Participant response, psychologists' evaluation, and comparison of personality and attitude questionnaire results before and after the group session indicate promise for the driver improvement program.

by E. Klebel; H. Michalke; L. Schmidt
Publ: Zeitschrift fur Verkehrsrecht v23 special issue p77-89 (1978)
1978 ; 43p 24refs
Special Reprint, translated from German (original 14p; translation 29p). Slightly abridged version of unpublished research report, "Driver Improvement--Initial Experience with Group Training for Traffic Offenders BMWF and BMJ with financial support of Nationalbank (Austria). with Alcohol-Related Problems," Vienna, July 1977. Research sponsored by
Availability: Reference copy only

HS-026 377

APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS

A study was made of the changes of visibility conditions on wet lighted roads compared with those on dry lighted roads, and to examine the possibility of adapting luminance design methods to the wet state. Considerable deterioration in the visibility of objects was found for the wet vs. the dry condition, but often the deterioration was not confirmed by observer subjective appraisals. The extentsion of luminance design methods to the wet state was found impossible. It is concluded that road lighting quality appraisals should be based directly on research studies of visibility on roads.

by P. Gordon
Publ: Lighting Research and Technology v9 n4 p177-88 (1977)
1977 ; 7refs
Availability: See publication

HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS

A review of several studies comparing accident experience before and during highway construction activity demonstrates that there continues to be a traffic safety problem associated with construction zone traffic control practices. One method of improving traffic safety near construction is the effective planning and design of construction zones; the first two of five logical steps in this approach are outlined: determining basic conditions, and selecting basic zone type and scheduling. The basic conditions have to be identified by obtaining construction data (lateral location, length, and expected duration of construction), roadway data (e.g. cross section, number and width of lanes, shoulder width, roadside obstacle clearance, median width, horizontal and vertical alignment), and traffic data (e.g. traffic composition and volume, vehicle speeds). Selecting the basic zone type involves separating traffic and construction activity in space and/or time. Space separation is accomplished by one of the following zone types: lane closure, crossover, temporary bypass, detour, or roadside work zone. Separation in time is accomplished by restricting either traffic or construction activity time. Entering what is covered in another item creates false drops.

by Robert Paulsen; John Glennon; Douglas Harwood; Jerry Graham
Publ: Rural and Urban Roads v16 n10 p56-8 (Oct 1978)
1978 ; 1ref
Abridged version of paper presented at 57th Annual Meeting of Transportation Res. Board, 17 Jan 1978. Pt. 2. Speed Control Strategy, is HS-026 379.
Availability: See publication

HS-026 379

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY

The last three steps in the effective planning and design of highway construction zones are outlined formulating speed control strategy, determining geometric design elements, and selecting traffic control devices and methods, and the effective management and operation of construction zones are discussed. The two main philosophies of speed control are maintenance of normal speed, and reduction of speed. Once the speed control strategy has been chosen, the construction travelway should be designed according to the geometric design standards required for the traffic speed; several principles to be followed in geometric design are outlined. The fifth and final planning and design step is the selection of appropriate traffic controls; their appropriate use is described, as well as several new devices developed to control traffic through construction areas. Zone management is discussed in terms of advance public warning, personnel training, zone operation evaluation, removal or alteration of inappropriate traffic controls and signs, movement of warning signs to keep pace with construction activity, and maintenance of traffic devices.

by Robert Paulsen; John Glennon; Douglas Harwood; Jerry Graham
Publ: Rural and Urban Roads v16 n11 p53-5 (Nov 1978)
1978 ; 20refs
Digest of a presentation at 57th Annual Meeting of Transportation Res. Board, 17 Jan 1978. Pt. 1, Problems and Improvements, is HS-026 378.
Availability: See publication

HS-026 380

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION

The future of the diesel car is discussed in terms of its particulate emissions and their potential carcinogenicity. In light of inconclusive findings of laboratory studies conducted by the Environmental Protection Agency (EPA) on the carcinogenic effects of diesel exhaust, both EPA and the auto industry (General Motors in particular) are increasing their research efforts. When some preliminary results will be available at the end of 1979, the EPA Administrator will decide, based on possibly very meager data, whether to allow or to ban continued production of diesel passenger cars. The diesel gets about 25% better fuel economy than the standard gasoline engine, but faces a problem in meeting emission standards. Particulate matter, nearly 0.5 kg/1000 mi of city driving, is the major emission concern. These bits of aggregated carbon (common soot) not only create odor and visibility problems but nearly 95% of them are coated with potentially harmful hydrocarbons. These particles are presently unregulated, although a standard has been proposed and may be promulgated by EPA at the end of 1979. Despite the lack of any successful particle-control technology, and the existence of many unanswered health questions, especially preliminary evidence that diesel particles may cause cancer, industry is tentatively moving ahead. The few epidemiological studies to date have not demonstrated direct links between diesel exhaust components and cancer nor have they vindicated diesel emissions. EPA will probably tell industry that there is insufficient evidence on which to ban diesels but that, in order to continue to produce diesel cars, industry must meet a particulate emissions standard (likely to be 0.6 g/mi for 1981 model year cars). Despite GM'S recent protests to the contrary, this standard can be met by diesel manufacturers, although not easily. Although the 0.6 g/mi standard may not be adequate to protect public health, EPA can still appear to be doing something about public health.

by Lois Ember
Publ: Environment v21 n2 p16-20, 38-41 (Mar 1979)
1979 ; refs
Availability: See publication

HS-026 381

A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION

A new shift mechanism for three- or four-speed automatic transmissions, compact in design and having a better shift quality, has been designed which consists of a single planetary gear set, two clutches, and an overrunning clutch mounted on the planetary input member. The ring gear member is detached from the turbine member by the overrunning clutch during the power-off upshift and the power-on downshift; it is therefore easy to control the timing of clutch engagement and disengagement. Refinement of the shift control method involves a shift valve for controlling the hydraulic pressure applied to the clutches and two timing valves for controlling the engagement/ disengagement timing. Theoretical and experimental studies have demonstrated that the new shift mechanism provides a better shift quality, and that the shift characteristics are remarkably affected by the vehicle vibration system, especially the torsional vibration of rear axles, the axle windup, and the engine fore and aft vibration. The new mechanism has been successfully applied to a Toyota four-speed automatic transmission with overdrive.

by Yoshio Shindo; Hiroshi Ito; Tomo-o Ishihara
Toyota Motor Co., Ltd., Japan; University of Tokyo, Japan
Rept. No. SAE-790043 ; 1979 ; 14p 7refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 382

A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS

The maximum capacity, cost, and safety of an automated highway system are largely dependent on the selected headway policy, i.e. the specification of a minimum acceptable headway (as a function of speed) for mainline operations. A policy, designed to avert collisions due to "reasonable" lead-car decelerations, is presented and evaluated in the context of achieving high capacity (greater than or equal to 3600 vehicles/lane/hr) over a range of typical highway speeds (13.5 m/sec to 30 m/sec (30.2 mi/hr to 67.2 mi/hr)). A detailed analysis was made to determine both the relationships among, and the requirements on, seven parameters requisite to this policy which pertain to systems-level operations, the capabilities of a vehicle's automatic control system, and the vehicle/roadway interface. The tradeoffs associated with safety, capacity, and cost (in the form of required future development efforts) are identified, and three general approaches to selecting parameters for an operational system are specified.

by Robert E. Fenton
Publ: IEEE Transactions on Vehicular Technology vVT-28 n1 p22-8 (Feb 1979)
1979 ; 10refs
Sponsored by Federal Hwy. Administration. Presented at 28th IEEE Vehicular Technology Conference, Denver, 22-24 Mar 1978.
Availability: See publication

HS-026 383

"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL

A "safe-approach" operating policy for automated guideway transit systems is presented which specifies velocity/spacing relationships for dynamic string operation. This policy is compared with steady-state policies such as constant time headway, constant separation, and constant K-factor. It is shown that only the safe-approach operating policy is consistent with collisionless service maneuvers. A description is given of how such a safe-approach policy can be used to implement vehicle longitudinal control systems. An example control system is discussed, which uses a basic velocity control loop for all overtaking and headway control operations. Simulation results are included to demonstrate the performance of this design. Ways are discussed in which the safe-approach policy may be further extended to handle emergencies and merge/diverge operations.

by Sidney J. Sklar; John P. Bevans; Gunter Stein
Publ: IEEE Transactions on Vehicular Technology vVT-28 n1 p56-62 (Feb 1979)
1979 ; 4refs
Availability: See publication

HS-026 384

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT

In Oct and Nov 1978, approximately 2000 randomly selec
Virginia families were called and a member of each househ
over the age of 16 was asked his opinion on various transpo
tion safety issues. About 80% of the respondents felt that
sons convicted of drunk driving would benefit from an alc
treatment program. A slight majority (53%) favored a l
drinking age (for beer) of 18, with about 27% preferring
years; slightly more preferred 21 years to 18 years as the
restriction for wine. An overwhelming majority (about 9
felt that driver education should be a prerequisite for per
obtaining a license before turning 18. A majority (74%)
favor the maintenance of a 55 mph speed limit. A majo
(86%) was found to approve of periodic motor vehicle ins
tion. Over 90% of the respondents (and over 76% of moto
clists polled) were in favor of mandatory helmet use by mo
cyclists. Only 33% of the respondents favored a mandatory
belt usage law (a figure lower than in a 1977 survey), w
more people (55%) than in the previous year favored ma
tory installation of passive restraints. Of the respondents,
felt that adequate progress had been made in improving
highways. The most common stated cause of railroad g
crossing accidents was dangerous practices by motorists.

by Cheryl Lynn
Virginia Hwy. and Transportation Res. Council, Charlottesv
Va.
Rept. No. VHTRC-79-*R51 ; 1979 ; 47p 9refs
Sponsored by Virginia Dept. of Transportation Safety.
Availability: Virginia Dept. of Transportation Safety

HS-026 385

SURVEY OF CHILD RESTRAINTS IN AUSTRALI [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]

Results are presented of a 1977 survey of Australians (via q
tionnaires in Australian Automobile Assoc. member jour
aimed at assessing possible major problems with various type
child restraints (including differences between Australian St
ard 1754 and E46 restraints), and the effectiveness of restr
in accidents. A total of 817 questionnaires were received,
plying information on 1349 restraints (858 seats, 381 harne
110 bassinets). Over three-fourths of the child seats and har
es were found to have been approved under one standard or
other. Only 3 children were reported to have been injure
the 155 accidents reported; in all but two cases, the restr
were considered to have performed satisfactorily. Forty-t
percent and 20% of child harnesses and seats, respecti
presented difficulty in transferring from one vehicle to ano
More difficulty was encountered moving child seats with
own anchorage straps than those using adult lap-sash
Forty percent and 23% of seats and harnesses, respecti
were difficult to adjust; 24% and 35%, respectively, allo
excessive child movement. There were fewer problems
seats approved to the new Standard AS 1754. Use of
inertia reel seat belts with child seats lacking upper restrai
straps did not appear to present any problems were that
dren were able to free arms to unfasten buckles, and that ad
ments slipped and straps cut into children. Some cases of u
ble and inadequately supporting seats were reported, as we
harnesses which could not be firmly adjusted. Netting, de

and size problems were associated with bassinette restraints. Little difference was found between restraints fitted in sedans and those in station wagons.

by R. G. Cox; D. M. Fleming
National Roads and Motorists Assoc., Traffic and Safety Dept., 151 Clarence St., Sydney 2000, N.S.W., Australia
1978 ; 34p 2refs
See also HS-026 386, The Use of Restraints by Children in Automobiles.
Availability: Corporate author (limited quantity)

HS-026 386

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:

Results are presented of an Oct-Nov 1977 survey in which 1300 vehicles containing 1677 children were observed in seven shopping centers in Sydney (N.S.W., Australia) to determine child restrain availability and usage. Restraint systems were available to 85.5% of the children observed (child seats and harnesses to 48.7%, adult lap or lap-sash belts to 36.8%). Only 48.9% of the children wore a restraint (43.8% with a child restraint, 5.1% with an adult restraint), with only 43.5% considered to be adequately protected. The number of unapproved child seats decreased from 104 in a 1976 survey to 69. Although 58.4% of the 6-mo to 4-yr age group were adequately protected, only 19.3% of the 4- to 7-yr age group were so protected. In only 16 of 49 cases had an attempt been made to restrain bassinets. Compared to the 1976 survey, the number of children adequately restrained showed a 10.5% increase, but remains relatively low. The introduction of new child restraint legislation in N.S.W. in Mar 1977 may have encouraged more parents to place their children in the rear seat and to purchase child restraints, but has failed to impress on parents that if no child restraint is available, the child one year of age or older must wear an available adult seat belt.

by D. Fleming
National Roads and Motorists' Assoc., Traffic and Safety Dept., 151 Clarence St., Sydney 2000, N.S.W., Australia
1977 ; 37p 3refs
See also HS-026 385, "Survey of Child Restraints in Australia."
Availability: Corporate author (limited quantity)

HS-026 387

ASSESSING THE NATIONAL 55 M.P.H. SPEED LIMIT

The desirability of the new national speed limit is evaluated, using tools of normative and positive economic analysis. The theoretical case for a speed limit is analyzed, and it is concluded that externalities in driving may justify the use of a speed limit, among other policies. The principal costs and benefits of the 55 mph speed limit are discussed, and available data are used in order to suggest reasonable estimates of costs and benefits. A number of conceptual and empirical limitations of the analysis are emphasized. Although the empirical analysis indicates that the benefits of the program outweigh the economic costs, a speed limit appears to be a second or third best policy for achieving both highway safety and fuel conservation goals. Other policies, aimed directly at these goals, might be more effective and could also eliminate the present inequity of penalizing, in terms of time costs, drivers of efficient compacts and gas guzzlers alike. Several possible policies which could be used to replace or, more likely, complement a national speed limit are gasoline price increases, taxation of cars on the basis of rated fuel consumption, mandatory seat belt usage, and mandatory installation of air bags in new cars.

by Charles T. Clotfelter; John C. Hahn
Publ: Policy Sciences v9 n3 p281-94 (Jun 1978)
1978 ; 25refs
Availability: See publication

HS-026 388

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST

An in-depth study sponsored by the National Hwy. Traffic Safety Administration of almost 1000 bicycle/motor vehicle accidents in several U.S. states has classified the accidents into 36 problem types, and a brief review is given of 7 types which caused 49% of the fatal and 52% of the nonfatal accidents. The problems, their representation in fatal and nonfatal accidents, and countermeasures are outlined. The accident types include emerging from a driveway without slowing or stopping; failure of bicyclists to slow or stop for stop signs at intersections; motorist entering street from a commercial driveway, stopping and scanning, but failing to see bicycle approaching from left or right; motorist stopping for a stop sign and then hitting cyclists proceeding into or across street that has no stop sign; motorist colliding into the rear of a bicycle going in the same direction (failure to observe bicycle because of darkness, high closing velocity, driver's expectation that road would be clear of bicycles, and inadequate lighting of bicycle); bicyclist riding on right edge of road turns toward left without looking to rear or signaling and collides with overtaking motor vehicle; and motorist turns left into path of bicyclist coming in his direction.

by Fred DeLong
Publ: Bicycling v19 n12 p56, 58-9 (Dec 1978)
1978
At head of title: Bike Law.
Availability: See publication

HS-027 364

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY

Following an overview of U.S. standards legislation for the three major motor vehicle policy areas (fuel economy, emission control, and safety), a review is presented of the legislative and administrative history of the mandatory fuel economy standards (National Hwy. Traffic Safety Administration rulemaking on fuel economy for passenger cars, 1981-1984, and for light trucks, 1980-1981), and the potential of such standards for achieving further improvements in new car fleet fuel economy is assessed. It is concluded that mandatory fuel economy standards have proved to be a powerful and flexible instrument for increasing motor vehicle fuel economy, and are likely to be employed further. Since it is not possible at the start of rulemaking to assess properly all the impacts of a regulatory decision, continuous reappraisal of proposed standards will be required as new information and knowledge are provided by interested parties. If, in the post-1985 decade, mandatory fuel economy standards are to continue as a useful strategy for fuel economy improvements, they will have to be supported by other Federal policies both to stimulate the marketability of fuel-economy motor vehicles and to mitigate the adverse economic effects on certain industrial sectors, regions of the country, and segments of the work force.

by Richard R. John; Philip S. Coonley; Robert C. Ricci; Bruce Rubinger
Transportation Systems Center, Cambridge, Mass 02142
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on Technological Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 p101-43 1979

46refs
Presented at the Symposium, held in Cambridge, Mass., 19 Oct 1978.
Availability: In HS-804 786

HS-027 365

BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO

A call is made for the Federal government to fund a long-term program to involve the public in transportation policy decisions. It is suggested that the National Hwy. Traffic Safety Administration (NHTSA), for example, expand its demonstration program to support public participation in rulemaking procedures, and that government should encourage the development of a corps of technicians who can evaluate, independently of government and industry, such matters as automobile safety, emissions control, fuel economy, public transportation, and transportation planning and use. It is proposed that the academic community interest itself in such issues as the social impact of the car. The automotive industry's economic clout with the media is seen in need of investigation and reform. It is pointed out that no organized grass-roots movement exists to oppose unregulated automobile production and the auto's indiscriminate use, and there are too few public interest and environmental organizations to compete adequately with the industry's special interest groups. Several major studies on the social impact of the automobile are deemed biased because of special interest overrepresentation. The NHTSA recognition of independent data and its support of public participation in Federal rulemaking procedures are cited. It is felt that the automobile as a consumer product is slowly coming under reasonable regulation. It is emphasized that a major regulatory failure has been the limitation of regulations to standardization of automobile components, and that consideration must also be given to the societal costs of auto-related air and water pollution, congestion, accidents, medical expenses, and government subsidies. The importance of a holistic approach to regulating the auto industry is emphasized, i.e. regulations in terms of the industry's products (through emission and safety standards), and in terms of how its products are used (through comprehensive and open planning processes).

by Brian Ketchum; Stan Pinkwas
Citizens for Clean Air, Inc.
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on Technological, Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 p145-79
1979 ; 33refs
Presented at the Symposium, Held in Cambridge, Mass., 20 Oct 1978.
Availability: In HS-804 786

HS-027 366

TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION

The issues of "institutional capacity" and strategy as related to government regulatory agencies and private industry (with particular reference to the auto industry) are addressed by exami ing the regulatory process. It is postulated that managers in th private sector and policymakers in the public sector typical lack specific and well-articulated strategies for dealing wi regulatory realities. Managers, it is said, often see regulatio narrowly in terms of increased dollar cost and uncertaint failing to recognize the legitimacy. Managerial significance, an competitive implications of regulatory actions. Policymake have an equally narrow view of regulations as either an admi istrative or policy problem, failing to recognize the diversity legitimate competing interests that are created by regulatio and expressed in the dynamic process of economics and politic The lack of attention to issues of institutional capacity an regulatory strategy is seen as related, at least in part, to generally poor understanding of the complex nature of the reg latory process. The regulatory process is described as intera tive, dynamic, and very sensitive to micro-level impacts, chara teristics which have important implications for the type of ana ysis required for effective regulation, the structure of public an private institutions, and the behavior and attitude of individu participants in the regulatory process. It is argued that befo they can develop adequate strategies, public and private mana ers must have better tools of analysis to assess the dynam characteristics of the regulatory process. All parties in the reg latory process also must distinguish analysis from decision, an must further distinguish decision from strategy. Analysis esta lishes the terms of trade among society's many conflicting o jectives; decision is at least partly an expression of preference policy strategy is a means of marshalling and organizing scar organizational resources so that over time the cumulative effe of individual decisions will lead to the desired ends.

by Robert A. Leone; John E. Jackson
Harvard Business School; University of Pennsylvania
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on Technological Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 pl81-213
1979 ; 7refs
Presented at the Symposium, held in Cambridge, Mass., 20 Oc 1978.
Availability: In HS-804 786

HS-027 367

INTERNATIONAL COMPETITION IN THE WORL AUTOMOTIVE INDUSTRY

Following a review of the market changes in the world's au manufacturing centers, U.S., Western Europe (U.K., German France, Italy), and Japan in the 1960's, the factors influenci international competion in the world automotive industry tod are examined. In that decade, market requirements were t main forces determining international competition, but in t 1970's, government policy has emerged as a primary influenc The role and effects are analyzed of the government as legis tor in the U.S., as owner in Western Europe, as promoter Japan, and as initiator in developing countries. Governme intervention in various forms is playing an increasing role in t pattern of international competition. Except for the U.S., go ernment intervention tries to aid its domestic motor industry protecting employment and/or encouraging investment. T U.S. policy is to implement legislation to protect the motor and conserve energy, which does not necessarily help its au industry. All the leading automotive producers have increasin ly to evaluate the various economic and political factors in the marketing strategies; these decisions are likely to be increasing directed towards investment rather than trade. Important que tions arise as to the continued legislative policy of the U. without the need to resort to some form of auto industry pr tection, and as to other governments' implementing environmental, safety, and fuel economy measures as in the U.S.

by Michael C. Pearce
Economist Intelligence Unit, Ltd.
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on Technological Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 p215-33
1979 ; 2refs
Presented at the Symposium, held in Cambridge,Mass., 20 Oct 1978.
Availability: In HS-804 786

HS-027 368

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?

The Federal automobile emission control policy is criticized as having undesirable characteristics, and it is argued that a program of effluent fees would eliminate most, if not all, of the unfavorable aspects. It is acknowledged that progress has definitely been made in emissions control technology in the past decade, but that this progress has been slower and more costly than necessary. The gradual phasing in of the emission standards for hydrocarbons, carbon monoxide, and nitrogen oxides had denied the auto industry the learning curve benefits from a long experience with one set of standards. The inflexibility of the standards approach discouraged the introduction of diesels and other alternative engines. Cars in use generally have not been attaining the certification standards; since the standards apply solely to the sale of new cars, car owners have no incentive to maintain their vehicles to achieve low emissions. Currently only a few states and local communities have mandatory inspection and in-use standards programs. The basic logic underlying an effluent fee is that polluters ought to be made to pay the marginal social costs of their polluting activities. By keying fees paid to actual emissions, such a policy allows individuals to take the most efficient actions open to them. If pollution avoidance is expensive, they will choose instead to pay the fee. If the fees are have an incentive to take avoidance actions; if pollution avoidance is expensive, they will choose instead to pay the fee. If the fees are properly structured to represent the marginal social costs of pollution, either choice represents an efficient outcome. Fees would be applied to all motor vehicles in use and on all easily measured harmful pollutants Fees would be based on short emissions test conducted annually, the amount paid based on mileage driven in the previous year, emissions levels, and particular fee schedules set according to local pollution problems. Individual car owners and automakers would both have incentives for "clean" cars.

by Lawrence J. White
New York Univ.
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33)," Workshops on Technological Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 p235-71
1979 ; 40refs
Presented at the Symposium held in Cambridge , Mass., 20 Oct 1978.
Availability: In HS-804 786

HS-027 369

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW

The history of multinational automobile enterprises (U.S., European, and Japanese automakers) and the influence of government regulation is traced for the pre-World II period, the Inter-War years, 1945-1970, and recent times (1968-1978). Government regulations of various sorts have had, and will continue in the future to have, an important influence on the industry in the U.S. and abroad. What is distinctive today seems to be the new and imposing impact of the particular regulatory measures concerned with safety, pollution, and expecially energy, on a thoroughly multinational industry. The specter of varying forms of trade restrain seems present; these restraints are bound to create distortions in international markets. All these national regulatory actions can have unanticipated consequences, unless policymakers view them in the context of multinational automobile enterprises operating through investment and licensing as well as trade in an increasingly intergrated worldwide auto industry.

by Mira Wilkins
Florida International Univ., Dept. of Economics
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on Technological Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 p273-326
1979 ; refs
Presented at the Symposium held in Cambridge, Mass., 20 Oct 1978.
Availability: In HS-804 786

HS-027 370

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE

Through a review of the trade literature, the present situation of the U.S. automotive supply industry is analyzed in view of the changing needs of the automakers in meeting Federal emission, fuel economy, and safety standards. The problems facing the auto suppliers include uncertainty in the auto market, squeeze on profits, emphasis on primary materials and electronics technology, ambiguity of Federal regulations, and influx of foreign auto suppliers. The response of auto suppliers to these problems is discussed in terms of marketing strategy, capital investment decisions, management organization and research and development strategy. The role of the auto suppliers, automakers, and Federal government in increasing the auto supplier's contribution to technological innovation in the automotive industry is addressed. The auto suppliers will need the ability to understand and work with government, to understand and respond to changing industry economics, and to correctly perceive the consequences of government regulation. They will also need to improve their interface with other suppliers and the auto companies. The automakers may also be able to improve their working relationship with the auto suppliers. It is incumbent upon the auto companies to reduce wherever possible the high risks and costs of the automotive original equipment market. The areas deserving government attention include product liability, international trade, antitrust activity, inconsistent regulations and enforcement, and incentives for innovation.

by Edward C. Dempsey
Harvard Business School
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on Technological Change in the U.S. Automobile Industry and Symposium on Technology, Government and the Automotive Future, Proceedings," Washington, D.C., 1979 pD-1--D-36
1979 ; 100refs
Availability: In HS-804 786

HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.

This student manual is the primary text (study materials and later reference source) for a training course for emergency medical technicians (EMT'S) which addresses the problems of light rescue, specifically those involved in extricating people from automobiles and buses. Although designed basically for EMT'S, this course also meets the requirements for teaching light-duty extrication methods to rescue and safety personnel who have completed the National Hwy. Traffic Safety Administration (NHTSA) First Responder Training Course. Specific objectives of the course are to teach EMT'S their role and responsibilities in extrication; to develop their skill in analyzing the accident situation, stabilizing, gaining access, instituting life-saving emergency medical care techniques, disentangling, and removing the injured victim from the wreckage; to develop their skill in the use and care of extriction and related tools and equipment; and to develop their awareness of the hazards which may be encountered at the accident scene. The course comprises five lessons involving 16 hours of instruction, and testing, and is designed to be taught in a two-day period. Desirable qualifications for EMT'S who attend the Crash Victim Extrication Course are: satisfactory completion of the NHTSA Basic Training Course for EMT--*AMBULANCE or equivalent, or the NHTSA First Responder Training Course; a desire to expand basic extrication knowledge; ability to work as a team member, and to analyze a situation accurately, and take or suggest an effective course of action; and meet state qualification standards.

National Hwy. Traffic Safety Administration, Emergency Medical Services Branch, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 37p 2refs
Clearinghouse Training Materials. Subject: Escape and Removal of Injured. Format: Student Manual. See also HS-803 444. Type of Audience: Emergency Medical Technicians.
Availability: GPO, stock no. 050-003-00344-1

HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.

This instructor manual is to assist course coordinators and other individuals in organizing and implementing a course of study which addresses the problems of light rescue (i.e. extricating accident victims from automobiles and buses) by emergency medical technicians (EMT'S). The manual contains an outline of the course, instructor and student qualifications, classroom and demonstration equipment requirements, guidelines for conducting the course, and recommendations for student evaluation. Although designed basically for EMT'S, this course also meets the requirements for teaching light-duty extrication methods to rescue and safety personnel who have completed the National Hwy. Traffic Safety Administration First Responder Trainin Course. Specific objectives of the course are to teach EMT'S their role and responsibilities in extrication; to develop their skil in analyzing the accident situation, stabilizing, gaining acces instituting life-saving emergency medical care techniques, disentangling, and removing the injured victim from the wreckage to develop their skill in the use and care of extrication an related tools and equipment; and to develop their awareness o the hazards which may be encountered at the accident scene The course comprises five lessons involving 16 hours of instruction, demonstration, individual participation, and testing, and i designed to be taught in a two-day period. Recommended clas size is 24 students, with at least one instructor aid for each eigh students during practice and demonstration periods. The lea instructor and instructor aides should be certified EMT'S, thoroughly knowledgeable in the information and skills for the particular lesson period. Personnel from fire, rescue and ambulanc services with extensive experience in extrication procedure should be utilized. Each lesson plan contains performance objectives, references, equipment and materials, content outline, demonstration outlines, practice sessions, and skill evaluations components. It is recommended that each student be evaluated o skill proficiency at the completion of each lesson (skill evaluation sheets provided); pop quizzes at the end of each lesson an a final written exam on knowledge objectives are also recommended.

National Hwy. Traffic Safety Administration, Emergency Medical Services Branch, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 46p 13refs
Clearinghouse Training Materials. Subject: Escape and Remova of Injured. Format: Instructor Manual. See also HS-803 443. Type of Audience: Emergency Medical Technicians.
Availability: GPO, stock no. 050-003-00343-3

HS-803 656

STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT

Purpose of this study was to build a stochastic model of futur vehicle populations, useable in investigating the uncertaintie inherent in Future Vehicle Populations. The model, called th Future Automobile Population Stochastic Model (FAP Model), consists of two major components: a model of new ca sales, the model of automobile demand developed by Wharto Econometric Forecasting Associates, revised to incorporate th new vehicle survival model that was developed; and a procedure for specifying future planned and unplanned events, whic specifies the future values of exogenous parameters of the mod and incorporates the uncertainty of these parameters into th model. A computer program of the FAPS/MODEL was wri ten and is documented in the report. Also appended are survey of earlier and recent models, with bibliography, notes o the Weibull distribution, and a brief discussion of the innovations in the FAPS model.

by D. Henry Golomb; Howard M. Bunch
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-TS-13729
Rept. No. UM-HSRI-78-15; DOT-TSC-NHTSA-79-20 ; 1979 ; 109p 39refs
Rept. 19 Apr 1977-15 Apr 1978.
Availability: NTIS

HS-803 842

ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT

Manufacturing cost data, including all of the elements of cost (fixed, variable, tooling), as well as production processing information is presented for a wide variety of automotive components and assemblies. A representative vehicle, a 1975 Chevelle, was disassembled and analyzed on a part-by-part basis. The various cost elements which comprise total manufacturing cost were calculated, applicable processing methods determined, material analyses completed, and other pertinent information compiled. The process, cost, and material information is presented in various formats. All information reflects the current automotive production methodology. Comparisons of costs and materials of engine and transmission parts are provided for the 1975 Ford Pinto, 1975 Chevelle, 1976 Audi 100LS, and 1976 VW Rabbit. A review is included of generally accepted cost analysis techniques used by automotive companies to develop comparative, or target, costs. The various methods are discussed, including those using the cost data bank information, detailed manufacturing process cost techniques, and sign variance. Process descriptions of the selected vehicle and engine/transmission parts include the number of process operations, material, grade of material, rough and finished part weights, cost of raw material, variable cost, and other cost elements. Groupings by physical characteristics, material, and manufacturing processes are used to study the cost effects for various types of similar parts from different vehicles. Other studies are included to illustrate the cost impacts of alternate materials on various components.

by Robert W. Reinhardt
Pioneer Engineering and Mfg. Co., 2500 E. Nine Mile Rd., Warren, Mich. 48091
DOT-TSC-1045-*MOD-3
Rept. No. DOT-TSC-NHTSA-79-19 ; 1979 ; 463p
Rept. for Mar 1977-Aug 1978.
Availability: NTIS

HS-803 855

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT

An interim report presents a study of U.S. automatic transmissions, exploring the design from the earliest manual sliding gear transmission up through the various forms of automotive gear boxes, with emphasis on the development of the automatic transmission. It contains, in tabular form, a description of the 1970-1975 engine/transmission/rear axle ratio/vehicle size and weight combinations available in all U.S. cars of this time period. Included are early developments, the evolution of the self-shift, development during the 1920's and new techniques in the late '20s and '30s, evolution, elements and family tree of the modern automatic transmission, with numerous diagrams.

by D. A. Hurter; P. G. Gott; C. A. Gottesman
Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140
DOT/TSC-1046
Rept. No. DOT-TSC-NHTSA-79-11.*I ; 1979 ; 132p
Rept. for Jun 1975-Dec 1976. Vol. 2, The Drivetrain Design Process With An Automatic Transmission, is HS-803 856.
Availability: NTIS

HS-803 891

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977

Following an overview of project background and operation, results are presented of an evaluation of the Utah Juvenile Court Alcohol School, based on an analysis of 30% of the data after six months of operation. The School, begun in 1976, is an educational program attended by random juveniles convicted of alcohol offenses, and their parents. The School consists of five-weekly, two-hour educational sessions; the changes in the school participants are measured by pre-, post-, and six-month follow-up questionnaires and record checks. For evaluation purposes, three juvenile/parent groups have been established in addition to the School Group; they are the Contact Group (use of five one-hour sessions), the Regular Group (court alternatives applied), and the Cohort Group (general juvenile population comparison group). Findings are presented for three treatment groups (and comparison group, where applicable) based on questionnaire responses which have been grouped under the following categories: background demographics, cohort demographics, criminal history, driving history, teen driver responses, treatment motivation, self-perception, family life perception, parental support of juveniles, juvenile perception of parental support, parental support of juvenile decision making, juvenile control, parent control, communications, socialbility level with peer relationships, alcohol knowledge, attitude toward use of alcohol. The interim evaluation revealed that data categories which showed no pre-post difference were about equal to those with interesting and statistically significant differences. Appendixes contain pre-, post-, and follow-up questionnaires for the Juvenile Alcohol School, and questionnaire response evaluation approach; evaluation file design for the Statistical Package for the Social Sciences, data keying format, data control procedures, and data collection coding forms; and the Juvenile Alcohol School Facilitator Manual.

by Stephen W. Glines; Roy N. Byrd
Utah Hwy. Safety Office, 455 E. 4th South, Suite 314, Salt Lake City, Utah 84111
DOT-HS-6-01487
Rept. No. DOT-HS-6-01487-(*I-1) ; 1977 ; 168p refs
Cover date is Mar 1979.
Availability: NTIS

HS-803 894

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT

Efforts toward identifying and establishing a Motor Vehicle Materials High-Volume Industrial Processing Cost Data Bank for the 3500-4000 pound Full-Size Car were a macro- and micro-analysis, in which various costs were generated using an industry type estimating technique. In the micro-analysis method, a 1978 full-size production vehicle (Chevrolet Impala) was obtained and dismantled, and its various components and subassemblies analyzed in detail to determine the weight and estimated manufacturing cost associated with each item. From this basic data, other categorical costs were estimated, both in total for each item and on a cost per pound basis. The various items were grouped into several levels of assemblies on a basis of practiced industry groupings to arrive at total cost categories for a complete vehicle. The macro-analysis served as a means to provide data in certain areas to substantiate the microanalysis, involving the detemination of various average costs by a study of the past five years of historical financial records of the automotive corporation. Appendices include the micro-analysis cost data, the macro-analysis of General Motors records, and photographs of components for use in future cost study comparisons. Additional studies are recommended on other market classes defined by weight and cost.

Pioneer Engineering and Mfg. Co., 2500 East Nine Mile Rd., Warren, Mich. 48091
DOT-HS-7-01769
1978 ; 330p
Availability: NTIS

HS-803 895

STANDARDS ENFORCEMENT TEST REPORTS INDEX FOR 1978

The tenth in a series of indexes is provided to Compliance Test Reports of the National Hwy. Traffic Safety Administration (NHTSA) released to the public during calendar year 1978. The index is divided into 11 sections: manufacturer, model year, model or part number, failures, Federal Motor Vehicle Safety Standard number, component or vehicle identification (NHTSA number), laboratory test number, CIR number, HS number, brand or seller, and tire size or body style.

Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
NHTSA-P.O.-8-0407
1979 ; 1572p
Availability: NTIS

HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.

Changes in levels of helmet use and in types of injury sustained by motorcycle accident victims between pre- and post-repeal periods of the South Dakota mandatory helmet law are described. Statewide surveys of helmet use in 1976 (pre-repeal) and in 1977 (post-repeal) involved the observance of 25,054 cyclists. Overall levels of helmet use were found to have dropped from 99.6% in 1976 to 57.3% in 1977 for cycle drivers, with a decline from 99.3% to 60.7% for passengers. Decreases in helmet use were large and significant for all times of day, days of week, and roadway types. Analysis of medical records data for motorcycle accident victims showed statistically significant increases in the incidence of head/skull injuries between pre- and post-repeal periods and between helmeted and unhelmeted drivers. Recorded levels of injury severity were significantly higher for unhelmeted drivers in both periods. Despite significant changes in incidence of head injuries, the statewide fatal, injury, and total crash rates were not substantially different between pre- and post-repeal periods.

by V. S. Ellingstad
University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069
DOT-HS-6-01423
Rept. No. HFL-78-8 ; 1979 ; 35p
Rept. for Jul 1976-Nov 1978.
Availability: NTIS

HS-803 974

ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT

Information is provided to aid analysts in assessing the costs an benefits of the administrative adjudication of traffic offenses i state and local jurisdictions. Issues are discussed related to th organization, management, and presentation of findings of feasibility study. Checklists of the types of benefits and cos that should be considered are presented, with data and exampl to aid in making quantitative estimates. Issues that normall would be addressed in a benefit-cost analysis of alternative adj dicative systems for traffic offenses include basic arguments fo administrative adjudication, legal and constitutional issues, a ticipation of special interest group concerns, the monetary an nonmonetary treatment of benefits and costs, and the treatme of traffic safety issues. Appendices contain additional materi on the technical aspects of a benefit-cost analysis of ministrativ adjudication, formats for the illustration and presentation findings, and other supporting information.

by Anthony K. Mason; Thomas J. Novi
Anthony K. Mason, P.E., 6209 Avenida Cresta, LaJolla, Calif. 92037
NHTSA-P.O.-7-3161
1978 ; 110p refs
Vol. 1 is HS-803 973.
Availability: NTIS

HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT

Results are presented for the first three of eight vehicle-to-tru rear underride guard crash tests designed to test the effectiv ness of selected new guard designs in rear underride collisio with current production full- and small-size passenger cars. T tests are to provide a basis for selecting the best underride gua with regard to such critical parameters as geometric desig strength, energy-absorbing capabilities, and economic and env ronmental factors. The test vehicles (1978 VW Rabbits and 1978 Ford Fiesta) were impacted (about 40 mph) into bolt-o rigid, cantilevered guards mounted to a truck/trailer body sim lator (a modified 1977 Fruehauf 40-ft, heavy-duty platform tra er with Select-A-Point tandem rear wheels). For the three sy metric tests, two instrumented 50th percentile Part 572 anthr pomorphic dummies were placed in the driver and front passe ger positions in the car, and were restrained with the vehicl restraint system. The seat tracks were welded in the midpositi to prevent breakaway and/or rotation.

by R. Baczynski; S. Davis; R. Cropper
Dynamic Science, Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-8-01905
Rept. No. 8319-78-193A ; 1978 ; 160p
Rept. for Oct-Nov 1978. See also HS-803 991 and HS-803 992.
Availability: NTIS

HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT

Results are presented for six vehicle-to-truck rear underride guard crash tests (four symmetric and two offset) designed to establish baseline parameters under present conditions with current production full- and small-size passenger cars. The test vehicles (1978 VW Rabbit and 1978 Chevrolet Impala four-door sedans) were impacted (about 30 mph and about 40 mph) into a bolt-on underride guard (Fruehauf Part No. FCE-1456-1) mounted to a truck/trailer body simulator (a modified 1977 Fruehauf 40-ft, heavy-duty platform trailer with Select-A-Point tandem rear wheels). For the six tests, two instrumented 50th percentile Part 572 anthropomorphic dummies were placed in the driver and front passenger positions in the car, and were restrained with the vehicle's restraint system. The seat tracks were welded in midposition to prevent breakaway and/or rotation.

by R. Baczynski; S. Davis
Dynamic Science, Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-8-01905
Rept. No. 8319-78-149A ; 1978 ; 260p
Rept. for Jun-Sept 1978. See also HS-803 990 and HS-803 992.
Availability: NTIS

HS-803 992

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT

Results are presented for two vehicle-to-truck rear underride guard crash tests (one symmetric and one offset) designed to provide data for establishing criteria for future tests in a program for the compliance testing of rear underride guards. The tests approximately model the rear of chosen truck trailer bodies to the extent of providing repeatable and indicative dynamic test results. The test vehicles (1966 full-size Ford Galaxy four-door sedans) were impacted (about 40 mph) into a bolt-on underride guard (Fruehauf Part No. FCE-1456-1) mounted to a truck/trailer body simulator (a modified 1977 Fruehauf 40-ft, heavy-duty platform trailer with Select-a-Point tandem rear wheels). For the two tests, one uninstrumented 50th percentile VIP anthropomorphic dummy was placed in the driver position in the car, and was restrained with the vehicle's restraint system. The seat tracks were welded in the midposition to prevent breakaway and/or rotation.

by R. Baczynski; S. Davis
Dynamic Science, Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-8-01905
Rept. No. 8319-78-139A ; 1978 ; 86p
Rept. for Jun-Aug 1978. See also HS-803 990 and HS-803 991.
Availability: NTIS

HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT

The S. Dak. statute mandating helmet use by motorcyclists was modified, effective 1 Jul 1977, to effectively repeal the law for adult cyclists. Changes in levels of helmet use and in state-wide accident experience are assessed between pre- and post-repeal periods. State-wide surveys of helmet use involving observations of 12,228 cyclists in 1976 and 12,826 in 1977 showed statistically significant declines in rates of helmet use for all sub-sets of cyclists. The overall rate of driver helmet use declined from 99.6% in the pre-repeal period to 57.3% during the post-repeal period. Passenger helmet use declined from 99.3% to 60.7% between periods. Large decreases in helmet use were observed for all time-of-day and day-of-week periods, and for all roadway types. Although no detectable changes were observed in state-wide fatal, injury, or total crash rates, analyses of medical data for accident victims showed substantial evidence of negative impact of helmet law repeal. During the 24-month study period, head/skull injuries were recorded for 9.2% of helmeted riders compared to 21.1% of unhelmeted riders. Injury severity was also significantly greater for unhelmeted than for helmeted accident victims.

by Cynthia Struckman-Johnson; Vernon S. Ellingstad
University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069
DOT-HS-6-01423
Rept. No. HFL-78-7 ; 1979 ; 106p
Rept. for Jul 1976-Nov 1978. HS-803 997 contains appendices.
Availability: NTIS

HS-803 997

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT

Materials and data supplementary to Vol. 1 of the study on impacts of motorcycle helmet law repeal in S. Dak. are presented in 14 appendices. These include a description of sites and area maps for the sampling locations, S. Dak. police reports and a medical injury data report form, copies of letters requesting hospital participation and victims' consent forms, raw frequencies for the accident file, driver-vehicle file and rider file variables, and extensive supplementary tables.

by Cynthia Struckman-Johnson; Vernon S. Ellingstad
University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069
DOT-HS-6-01423
Rept. No. HFL-78-7-*APP. ; 1978 ; 174p
Rept. for Jul 1976-Nov 1978. Vol. 1 is HS-803 996.
Availability: NTIS

HS-804 010

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT

An initial assessment is presented of the literature in critical areas related to the measurement, control, atmospheric processes, and possible health effects of unregulated diesel engine emissions, under four major topics: measurement and characterization of emissions; control technology; atmospheric transport, transformation and microbiological assay; and carcinogenic aspects. Primary emphasis is directed at particulate matter, with secondary emphasis on odor and gaseous phase organics. A separate bibliography follows each section.

by Jerar Andon; Harold M. Siegel; John H. Johnson; David G. Leddy Cauwenberghe; Ivar Tombach; Thomas H. Milby; Donald V. Lassiter
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105; Michigan Technological Univ.; University of California, Statewide Air Pollution Res. Center; AeroVironment, Inc.; Environmental Health Associates, Inc.
DOT-HS-7-01790
1979 ; 515p refs
Rept. for Mar 1978-Jan 1979.
Availability: NTIS

HS-804 018

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT

An evaluation was made of the effects of the repeal of the Kansas mandatory motorcycle helmet law (effective 1 Jul 1976), through a retrospective analysis of the incidence and severity of injuries to motor cyclists involved in accidents in pre- and post-repeal periods. In addition to collecting data on accidents and injuries occurring in 1975 and 1976, an observational survey was completed during 1977 to determine current usage of motorcycle helmets and/or eye protection. The overall usage of motorcycle was found to be 47.1%. while some form of eye protection was used by 70.2% of those observed. The data indicate that statistically significant increases in the incidence and severity of injuries to the head and to the general body occurred between the pre-repeal and post-repeal periods. Extremely significant increases were found for nonhelmeted vs. helmeted riders. The data also indicate that the crude death rate was significantly higher for nonhelmeted vs. helmeted motorcyclists.

by Michael L. Lummis; Glenn J. Tucker
University of Kansas Coll. of Health Sciences, Emergency Medical Training Prog., 39th at Rainbow Blvd., Kansas City, Kans. 66103
DOT-HS-7-01563
1979 ; 172p 3refs
Rept. for Jul-Sep 1975 and Jul-Sep 1976
Availability: NTIS

HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT

by R. M. Zimmerman
New Mexico State Univ., Physical Science lab., Box 3-PSL NMSU, Las Cruces, N. Mex. 88003
DOT-HS-7-01572
1978 ; 34p
Rept. for 11 Feb-1 Apr 1978. For abstract, see HS-804 026. Cover date is Apr 1979.
Availability: NTIS

HS-804 026

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.

An investigation was made of the methods and materials that might be used to retrofit protective padding to older model school bus seats, modesty panels, and stanchions. Laboratory tests were designed to compare these bus components with and without protective padding. The tests were conducted under Federal Motor Vehicle Safety Standard (FMVSS) 222, School Bus Seating and Crash Protection, guidelines in an attempt to evaluate applicability to retrofitting. Impact tests were conducted on existing commercial retrofit padding and on candidate materials. It was determined that the dynamic portions of FMVSS 222 could be applied to the retrofitting of older model school buses. The seat back rail and the modesty panel were found to be the most dangerous objects in terms of potential facial injuries. It was found that the older model school bus seats do not present severe danger of concussion-type head injuries as defined by the Head Injury Criterion value of FMVSS 222. It is concluded that existing commercial paddings could be used to minimize facial-type injuries in accordance with FMVSS 222.

by R. M. Zimmerman
New Mexico State Univ., Physical Science Lab., Box 3-PSL NMSU, Las Cruces, N. Mex. 88003
DOT-HS-7-01572
1978 ; 121p 2refs
Rept. for 11 Feb-1 Apr 1978. For summary report, see HS-804 025. Cover date is Apr 1979
Availability: ntis

HS-804 031

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984

The Section 403 (of the Highway Safety Act of 1966) program priorities are described, along with supporting rationale, for fiscal years 1980 through 1984. Specific projects and associated funding are presented by year, as well as the program areas. Project area descriptions and resultant products are included. The proposed plan provides the U.S. highway safety community and general public with an opportunity to react and comment during the early stages of the 403 program planning process. The National Hwy. Traffic Safety Administration (NHTSA) is also seeking the expertise of the safety community by sponsoring a 403 Program Conference at the Dulles Marriott Hotel, Chantilly, Virginia, Apr 22-26, 1979, to be conducted by the Transportation Research Board (TRB) of the National Academy of Sciences. That organization will act as an independent and objective moderator for reactions to the 403 Program Plan, and will formally report the Conference results to NHTSA, the safety community, and the public by Aug 1979. The intention is to provide a neutral atmosphere for the integration of private, public, and government opinion for the purposes of molding a 403 highway safety plan which is responsive to state and community needs. The TRB Conference Report will assist NHTSA in its Section 403 planning, and along with comments to the docket, will form the basis for publication of an updated Section 403 plan in late 1979.

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 131p
Availability: Corporate author

HS-804 093

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT

Results are reported of research aimed at investigating the rollover response characteristics of automobiles. Emphasis was placed on the development of a test procedure to evaluate performance under untripped flat-surface operating conditions. Both simulation and full-scale experimental methods were employed to examine the effects of a variety of configurational and operational factors on rollover response. Over 500 test runs involving seven vehicles in ten configurations were performed. Studies were made of the effect of initial speed, steering input patterns, braking techiniques, suspension damping, loading, and tire characteristics. Testing was performed using both manual and automatic control methods. Appended are a review of the literature concerning rollover in actual accidents, analyses of the physics of tripped and flat surface (untripped) rollover, a discussion of the simulation study results, and an outline of a preliminary test procedure for vehicle rollover resistance evaluation. It was concluded that vehicle rollover response is dominated by the vehicle's rigid body geometry (with dynamic contributions from suspension effects) and that untripped rollover, even on highly skid-resistant surfaces, is difficult to predict and accomplish.

by Roy S. Rice; David J. Segal; Ian S. Jones
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-6-01382
Rept. No. ZQ-5993-*V-1 ; 1978 ; 231p 32refs
Rept. for 30 Jun 1976-30 Jun 1978. Vol. 2 Executive Summary, is HS-804 094.
Availability: NTIS

HS-804 095

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT

The inconsistency between various state laws and the Uniform Vehicle Code is reviewed regarding lighting systems for special vehicles and school buses. Accident data are cited that may have pertinent implications to the problem of lighting system design for these vehicles. Driver behavior problems are discussed that may be associated with the ambiguity of current signal messages, and an analysis is presented of the signal messages necessary to conduct particular vehicular missions. The review indicates that there is a diverse array of lighting devices available. Psychophysical visual and applied research was reviewed for information on the advantages and disadvantages of various coding parameters. An analysis of color, intensity, and flash rate summarized the information available that is applicable to special vehicle signaling systems. From this information was developed a set of recommended signals to transmit the messages deemed necessary for the efficient and safe control of various vehicular missions. These recommendations took into account current legal, stereotype, and changeover constraints. School bus signaling procedures were also reviewed and specific recommendations are made for new signals, usage procedures, legal language, and research.

by David V. Post; Michael Sivak
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-HS-6-01468
Rept. No. UM-HSRI-78-55 ; 1978 ; 163p refs
Rept. for 14 Sep 1976-15 Nov 1978.
Availability: NTIS

HS-804 151

THE UNITED KINGDOM AUTOMOBILE INSURANCE MARKET. FINAL REPORT

A limited study is presented of the United Kingdom automobile insurance industry, under six major topics: structure and size of the industry (proprietary and mutual insurance companies, and Lloyds Underwriters); the basis of premium calculation, rate structure, types of policies, and payment of compensation; marketing of insurance; the role of the (British) Automobile Assoc. and the Royal Automobile Club; differences between individual and fleet insurance policies; and the profitability of the British insurance system. Appended are lists of members of the British Insurance Assoc. and of Lloyds Motor Underwriters Assoc.

Economist Intelligence Unit, Ltd., Spenser House, 27 St. James Place, London, SW1A 1NT, England
DOT-TS-15109
Rept. No. DOT-TSC-NHTSA-79-23 ; 1979 ; 40p
Rept. for Feb-May 1978.
Availability: NTIS

HS-804 186

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984

The National Hwy. Traffic Safety Administration's (NHTSA) five yhear plan for motor vehicle safety and fuel economy updated from that of 16 Mar 1978 (43 F.R. 11100), is designed to provide policy guidance for use within NHTSA for the development and issuance of standards, to provide the public with information on proposed future activities and priorities, and to permit the motor vehicle industry to incorporate potential requirements in its long-range planning. The tentative rulemaking goals and priorities are briefly described and summarized, and public comments analyzed. Accomplishments since the draft publication are identified, as well as those areas where significant rulemaking is not expected to take place. A rulemaking schedule shows the anticipated dates for issuance of proposals and final rules and a rough estimate of the anticipated effective dates. Also included are those pending rulemaking actions which NHTSA contemplates terminating. Cross-referenced indexes cover changes since the Mar 1978 rulemaking plan, proposed safety rulemaking by vehicle type, and rulemaking by proposed effective date. An appendix describes in more detail the individual motor vehicle safety rulemaking actions, including a discussion of the safety problem that a regulation is designed to ameliorate, the approach to be used in developing and issuing the rule, and some of the major issues to be resolved in the development of the final rule.

National Hwy. Traffic Safety Administration, 400 7th St., S.W. Washington, D.C. 20590
1979 ; 66p refs
Availability: Corporate author

HS-804 189

RSV [RESEARCH SAFETY VEHICLE] PHASE 3. PROGRESS REPORT NO. 12, DECEMBER 1978-JANUARY 1979

Progress made on the Minicars RSV (Research Safety Vehicle) Phase 3 program is reported in task sections, summarized to the subtask level. Tasks include program management, product improvement of inflatable restraints, structural refinement, systems refinement, plastic material improvement, electronic system, ride and handling, pedestrian impact, compatability analysis, high-technology engine/transmission, structures and systems fabrication, accident/benefit analysis, and advanced engine. Tasks involving the Large Research Safety Vehicle (LRSV) include structure, restraints, design integration, testing, technology transfer support, and demonstration vehicle. Glazing, production planning, tooling, and pilot production are also reported. Appended are data traces for driver and passenger restraint system sled tests, for pulse development sled runs, and for 50 mph frontal impact test of RSV with a flat barrier. Also appended are subcontractor reports from RCA Labs. (electronics), Dubner Computer Systems, Inc. (analysis of high-technology transmission data), and Kinetic Res., Inc. (analysis of National Crash Severity data, comparison of vehicle population data used in the Kinetic Res. Accident Environment Simulation and Projection model with similar data projected by the Wharton Motor Vehicle Demand model).

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-7-01552
Rept. No. BPR-2100-01-79 ; 1979 ; 245p
Availability: Reference copy only

HS-804 718

FINAL ASSESSMENT OF THE BUMPER STANDARD

After examination of all available information from public comment, special orders to manufacturers, and crash tests, the costs and benefits were assessed of bumper technology used to comply with the Part 581 Bumper Standard issued in 1975. The analysis was made in three steps: various bumper systems and design speeds were defined; the costs and benefits were derived that accrue with each of ten bumper systems at each design speed decision; and totalled costs and benefits provided the net benefit for each bumper system at each design speed. Among the bumper systems considered are the unregulated (baseline) system, and steel, aluminum, and soft face bumpers (Phase I). A discussion of Phase II bumpers is appended. The first phase of the standard, effective 1 Sep 1978, requires that the vehicle, other than the bumper system, not be damaged in 5.0 mph front and rear barrier and pendulum impacts and 3 mph corner pendulum impacts. The second phase, effective 1 Sep 1979, limits the damage to the bumper itself. Included in the analysis are factors of obtainable costs and benefits, effect on insurance and legal fees, savings of consumer time and inconvenience, and considerations of health and safety. Further research is investigating reduction of injury to pedestrians by new urethane bumpers and front ends.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 205p 24refs
Executive Summary is HS-804 719.
Availability: NHTSA

HS-804 719

FINAL ASSESSMENT OF THE BUMPER STANDARD. EXECUTIVE SUMMARY

A revised analysis is summarized of the comparative cost savings for car owners from the Federal 5.0 mph bumper standard and alternative 2.5 mph and 7.5 mph standards. A number of changes in the analysis and data from the initial 26 Feb 1979 report are summarized, focusing on steel bumpers; topics discussed are vehicle miles traveled/1978 dollars, prestandard damage/effectiveness of improved bumpers, bumper replacement costs, and insurance adjustment. The final assessment shows that 5.0 mph bumpers provide greater savings to the consumer than 2.5 mph bumpers. The Feb analysis showed that the net lifetime benefits of 2.5 mph bumpers were approximately $77 greater than the net benefits of 5.0 mph bumpers, sales-weighted by bumper type (steel, aluminum, soft face). The revised analysis shows that the 5.0 mph bumpers produce approximately $39 more in net benefits than the 2.5 mph bumpers. The net benefit is the present value of the expected savings resulting principally from damage avoided as a result of improved bumpers less the cost increases associated with the purchase and use of improved bumpers. The revised analysis also indicates that 7.5 mph bumpers produce marginally greater savings than 5.0 mph bumpers, although these results are far less reliable because of the many assumptions that were used in the 7.5 mph bumper analysis.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 12p
Complete text is HS-804 718.
Availability: NHTSA

HS-804 722

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.

By restricting the roll angle of the vehicle to small values, fourth order differential equations (which neglect the effects of wheel dynamics, vertical motion, and constrain vehicle motion so that wheels are always on the ground) are shown to be reduced to the classical bicycle model of vehicle motion. Not all of the coefficients in this second order model are measurable, but may be computed if the transfer function of the vehicle is known. Using the second order model, plus the well-known result from control theory which implies that the quasilinear behavior of most physical systems is well approximated by a linear second order differential equation with variable coefficients, a method has been demonstrated which makes possible the estimation of the transfer function coefficients for the second order model from data taken by the Driver Performance Measurement and Analysis System. A second method has been developed for estimating the bicycle model physical parameters, once the yaw rate to steer angle transfer function is known. It was observed that, if the second order model thus estimated gives a reasonable fit to the data, then a very simple measure, based on the damping ratio of the second order roots of the model, can be used to display a measure of relative vehicle stability which is a function of both speed and lateral acceleration.

University of Missouri-Rolla, Rolla, Mo.
DOT-HS-7-01533
1978 ; 7p
Technical Report is HS-804 721.
Availability: Reference copy only

HS-804 748

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan addresses activities designed to identify, develop, and transfer to the states and to communities, those systems, technologies, guidelines, and information that will help them reduce violations of the 55 mph speed limit and certain other unsafe driving actions (UDA'S) causally associated with traffic accidents (e.g. following too closely, making unsafe entry into traffic flow, driving at unsafe speed for conditions). The highest priority and most of the overall effort called for in this plan are allocated to developing and testing procedures for improving compliance with the 55 mph speed limit. The highest priority programs proposed for development and test include police enforcement and related public information techniques, strategies, and programs designed to deter violations, to increase the risk of detection and apprehension for 55 mph violation, and to alert drivers to this increased apprehension risk; public information and education programs to inform the driving public of the safety and energy benefits of the 55 mph speed limit, thereby improving voluntary compliance; and programs for citizen reporting of individual violators or high violation areas to assist in deterring violations. The plan also covers the development of countermeasure procedures for selected UDA'S. Interface with police traffic services, traffic law adjudication, and driver license plans is anticipated when the results of research included in the plan become available.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 22p
See also HS-804 749--HS-804 758.
Availability: NHTSA

HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan addresses activities designed to identify, develop, and transfer to the states and to communities, those systems, technologies, guidelines, and information that will help them reduce urban and rural pedestrian accidents, bicycle/motor vehicle accidents, and school bus accidents. Problem identification for newly identified accident situations will receive priority effort. Countermeasures for second priority accident types will be developed and test and demonstration projects conducted. Previously implemented countermeasures will be evaluated. Passing on new developments and management and technical information to the states will be a prime activity. In the rural pedestrian area, major efforts will be devoted to countermeasure development, test, and demonstration. Activities in the area of bicycle/motor vehicle accidents will focus on countermeasure development, test, and demonstration and the transfer of research findings and information on state program efforts. In the area of pupil transportation, attention will be devoted to problem identification, and countermeasure development, test, and demonstration. Included in the plan is investigation of relevant parts of the Alcohol, Young Driver, and Driver Licensing Area Plans.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 21p
See also HS-804 748, HS-804 750--HS-804 758.
Availability: NHTSA

HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan addresses activities for improving the capabilities of state and local program management to implement the "process" approach for the state and community Highway Safety Program. The major objective guiding proposed program efforts is to provide the leadership, technical assistance, management procedures and tools, and training programs to states for carrying out efficient and effective highway safety operations. To facilitate the transition from the past "standards" or prescriptive approach to the process approach in safety management, priorities have been established under the following categories: data analysis and problem identification; planning and programming, including the steps and procedures necessary to develop a viable Highway Safety Plan; evaluation, including procedures, methodology, and criteria for conducting impact, administrative, and overall statewide evaluations; and manpower development and training for state, regional, and headquarters personnel. Activities in this program area will interface with most of the other plans, particularly the Traffic Records Plan.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 7p
See also HS-804 748, HS-804 749, HS-804 751--HS-804 750
Availability: NHTSA

HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan addresses activities designed to improve the components of the traffic law system that deal with enforcement, adjudication, and sanctions. Efficiency of performance, fairness to motorists, and effectiveness in driver control are the objectives. Planned activities will address the following problems: the lack of education and training for prosecutors, judges, court clerks, and court administrators in the highway safety impact of their role in the traffic law system; the need to simplify and make more efficient the adjudication of minor traffic cases; and the unnecessary practice of immediate arraignment of nonresident traffic violators, which consumes a large amount of police time. The priorities are as follows: training of traffic adjudication professionals, promotion of the Nonresident Violator Compact, development of model information systems for traffic courts, packaging of existing materials on administrative adjudication for transfer to the states, and testing and demonstration of model traffic adjudication system. Activities in this program area relate to the Enforcement, Driver Licensing, Driver Education, and Alcohol Plans.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 9p
See also HS-804 748--HS-804 750, HS-804 752--HS-804 758.
Availability: NHTSA

HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan will help to provide effective guidance, and technical assistance to enforcement agencies in order to improve the efficiency and effectiveness of police traffic services and to increase the amount of police effort allocated to traffic services. The plan is designed to use the members of authoritative police organizations and nationally recognized police educational institutions to help identify problems for "product" development by the National Hwy. Traffic Safety Administration, to act as quality control for the product developed, and to help "market" the product or technology transfer within the police community. The necessary technical assistance will be solicited through workshops, advisory groups, and seminars. Police organizations to be used initially include the following units of the International Assoc. of Chiefs of Police: the Hwy. Safety Com., the State and Provincial Div., and the State Police Planning Officer's Section. Future efforts will include the National Sheriffs Assoc., the Traffic Inst. (Northwestern Univ.), and the Southern Police Inst.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.
Washington, D.C. 20590
1979 ; 6p
See also HS-804 748--HS-804 751, HS-804 753--HS-804 758.
Availability: NHTSA

HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

The Driver Licensing Plan (DLP) is designed to develop a modern, comprehensive driver control system that will upgrade the general level of driver performance in the U.S. and will contribute to a reduction of the incidence of highway traffic accidents involving unqualified and impaired drivers. The DLP fundamentally seeks to develop socially acceptable policies and procedures for use by the states in administering their driver licensing and driver improvement functions and in detecting and correcting deviant driver behavior. The results expected from research and from demonstration programs in driver licensing will help strengthen and modernize various licensing procedures, will improve postlicensing control and driver improvement activities, will promote more effective use of driver record and enforcement personnel, and will expedite the adjudication and disposition of traffic offenses. The following program c ponents are proposed to address major deficiencies in the dri licensing system: the "one-license, one-record" concept (addr es the problem of multiple licenses and records, provides proved driver identification and system security, and fills need for an updated and strengthened Driver License C pact), control of suspended or revoked (S/R) drivers (provi methods for control of S/R drivers through specific coun measure development, evaluation of "hardship" or "occupati al" licensing), technology transfer (provides prompt transfe driver licensing administrators such products as Traffic L Commentaries, improved driver screening materials, and be definition of regulatory problems and recommended solutic model comprehensive driver licensing system (development implementation), heavy-duty vehicle operators (development special tests, regulatory procedures, and driver improvem procedures), and medically impaired and elderly drivers (de opment of risk levels, along with medical criteria and match of driver disabilities to licensing restrictions, provision of gui lines for assisting elderly drivers in personally meeting and co pensating for medical problems).

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 22p 30refs
See also HS-804 748--HS-804 752, HS-804 754--HS-804 758.
Availability: NHTSA

HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLA FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TIT 23, USC

The National Driver Register (NDR) is designed to assist st in identifying and controlling problem drivers, thereby reduc accidents and the resultant injuries, fatalities, and prope damage. Concurrently with the continuing operation of NDR, the development of a replacement system with ra response capability that is responsive to expressed state need being pursued on a priority basis. It is planned to operate a p system in four states during FY 1981 for purposes of demons tion and evaluation. Upon favorable evaluation of the system is planned to phase four states into the system annually until users desiring rapid response capability are accommodat Other users would participate through the mails as before.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 10p
See also HS-804 748--HS-804 753, HS-804 755--HS-804 758
Availability: NHTSA

HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLA FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TIT 23, USC

This plan addresses activities for improved motorcycle moped safety. The proposed program efforts are designed develop an internal planning document to guide National Hwy. Traffic Safety Administration (NHTSA) officials and program managers in preparing program strategies and necessary resource requirements, and to provide the public, private groups, and government at all levels with insight into NHTSA'S plans. The plan will permit these groups to comment during the early stages, and will permit the motorcycle and moped industry and appropriate government agencies to anticipate NHTSA actions in their own planning. The overall goal is to reduce motorcycle and moped accidents, injuries, and fatalities. The following program areas are given the highest priority: conspicuity, with emphasis on both rider and vehicle visibility; operator education and training, including both novice and experienced operators; operator licensing, including development of a complete licensing system; rider protection, with particular attention to helmet usage; and moped safety, involving program development to counter predicted safety problems inherent in increased moped use. Activities in this area are closely related to those of the Young Driver and Driver Licensing Plans.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 24p 3refs
See also HS-804 748--HS-804 754 HS-804 756--HS-804 758.
Availability: NHTSA

HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan addresses activities to reduce the vast number of young drivers involved in highway accidents. The two problem groups addressed are the novice driver (generally aged 16 to 19) and the young driver (aged 20 to 24). The scope of the planned efforts includes not only the licensing of young drivers at age 16 but also safety activities, particularly educational projects, directed at the younger, predriver groups. Although prevention (through driver education and licensing programs) is the primary area of emphasis, the detection and driver control functions of the police, courts, and rehabilitation agencies have an important role. Emphasis is also placed therefore on enforcement, adjudication, driver improvement, and sanction programs directed at the young driver. The overall goal is to prevent accident occurrence through teaching effective skills, providing traffic safety information, instilling safe-driving attitudes, and using improved licensing procedures, coupled with the general and specific deterring effects of appropriate enforcement, adjudication, and driver improvement and retraining programs. Activities in this plan interface with those in the alcohol, speeding motorcycle, safety belt, and safety support system plans.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 37p 12refs
See also HS-804 748--HS-804 755, HS-804 757, and HS-804 758
Availability: NHTSA

HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

The Emergency Medical Services (EMS) Program is designed to ensure that victims of traffic accidents and medical emergencies receive prompt and adequate emergency care. This plan addresses activities for a comprehensive EMS system that includes emergency equipment, manpower, and facilities. The following specific traffic safety program goals are listed in priority order: to develop additional criteria for evaluating EMS system effectiveness and societal value, to formulate guidance for rural EMS development, to update and maintain EMS-RELATED training programs, to develop guidance for best use of the EMS system elements, and to assess and take advantage of available technological opportunities (both hardware and software) to reduce the cost and increase the effectiveness of the EMS system. Activities in this program area interface with those of the following individual implementation plans: Driver Licensing, Motor Vehicle Registration, Motor Vehicle Inspection, Police Traffic Services, Debris Hazard Control and Cleanup, Traffic Records, and Driver Education.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th ST., S.W.,
Washington, D.C. 20590
1979 ; 26p 8refs
See also HS-804 748--HS-804 756, and HS-804 758
Availability: NHTSA

HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC

This plan addresses activities to increase the number of people who use occupant restraints (active safety belts, air bags, automatic belts, child restraints) while traveling in motor vehicles. The five primary areas of activity are research, development, and pilot testing of various approaches for promoting restraint usage; education programs (including workshops) and materials distribution efforts; a coordinated mass media program; evaluation of education media, and legislative efforts; and assessment of restraint usage. The highest priority is program and countermeasure development, including workshops for advocacy groups and a coordinated mass media public information program. Secondary priority is given to program evaluation and evaluation support for state programs. Two other programming areas within the scope of Section 403 are the research and development of hardware by the Office of Passenger Vehicle Research, and the multidisciplinary accident investigation efforts involving occupant restraints by the National Center for Statistics and Analysis.

National Hwy. Traffic Safety Administration, Office of
Management Services, Room 4423, 400 7th St., S.W.,
Washington, D.C. 20590
1979 ; 24p 2refs
See also HS-804 748--HS-804 757.
Availability: NHTSA

HS-804 759

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984

Except for fuel economy rulemaking, which was addressed in the main body of the plan, a detailed discussion is presented of the contemplated motor vehicle safety rulemaking activities included in the rulemaking plan. The appendices are presented in three sections in the order that they appear in the plan. Appendix A describes the near-term rulemaking, where information now available appears sufficient to justify Federal rulemaking activity. Appendix B describes the proposed technical amendments, minor rulemaking actions to clarify existing requirements or to resolve specific technical problems. Appendix C describes exploratory research and rulemaking activities, where there is obvious need for improvement but where precise solutions have not been developed or the role of Federal regulation has not been defined. Each rulemaking action is described by title, objective, applicability, safety problem, approach, and schedule (where appropriate).

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 78p
Availability: NHTSA

HS-804 786

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT

The purpose of five workshops and a final symposium held at Harvard Univ. during 1977 and 1978 was to explore the implications of technological change in the U.S. automotive industry in support of improved policy formulation to meet emerging national needs. The impetus for these changes originates mainly in direct government policy, but also in diminished energy resources, and international competition. The meetings were designed to gather insight and understanding from specialists who have intimate knowledge about problems and opportunities for improvement. A unique objective of this program has been to engage a broader range of participants than heretofore in a constructive effort to promote progress in a form consistent with national needs. The five workshops dealt with the motor vehicle regulatory process, the consumer and the supply industry as factors in motor vehicle innovation, changing incentives for motor vehicle research and development, and the role of national and multinational corporations in motor vehicle innovation. The five key issues emanating from these workshops were the Federal research and development policy in the motor vehicle sector, product rating information for consumers, regulatory decision-making, regulation and international trade, and transportation policy.

by William J. Abernathy, Ed.; Douglas H. Ginsburg, Ed.
Harvard Univ., Graduate School of Business Administration, Soldiers Field Rd., Boston, Mass. 02163
DOT-TSC-1384
Rept. No. DOT-TSC-NHTSA-79-33 ; 1979 ; 412p refs
Rept. for Oct 1977-Apr 1979. Includes HS-805 136, HS-810 352, and HS-027 364--HS-027 370. Meetings jointly sponsored by Dept. of Transportation and Harvard Business School. Only symposium papers with DOT support included; others will be available in a text published by McGraw-Hill Book Co.
Availability: NTIS

HS-804 910

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 1: SUMMARY TECHNICAL REPORT. FINAL REPORT

by R. Schwarz
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
DOT-HS-7-01722
1979 ; 14p
Rept. for Oct 1977-Apr 1979. For abstract, see HS-804 911, V
2, Final Technical Report. Vol. 3, Appendix A, is HS-804 913
Availability: NTIS

HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATIO OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT

The results are summarized of a detailed review of existi
experimental data from staged automobile collisions, and lo
range plans are presented to meet future data needs in relati
to computer aids for reconstruction of highway accidents.
total of 141 staged collisions involving 170 individual vehic
with usable damage information were reviewed. The experim
tal damage data were coded and entered in a computerized d
bank which was developed within the research program. O
seven staged collisions were found to include usable documen
tion of data from the spinout trajectories of the vehicles. I
tailed plans are presented for application of the developed d
bank. A sample application to refine the empirical structu
crush tables of the CRASH (Calspan Reconstruction of Ac
dent Speeds on the Highway) program is included in the rep
All data collected within the research program are append

by Raymond R. McHenry; James P. Lynch; David J. Segal
Calspan Corp., 4455 Genesee St., Buffalo, N.Y. 14221
DOT-HS-7-01511
Rept. No. ZQ-6057-*V-3 ; 1978 ; 116p 65refs
Rept. for Dec 1976-Jun 1977. Vol. 2-4 are HS-805 038--HS-80
040.
Availability: NTIS

HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATIO OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPOR

Computer reconstructions of the twelve staged collisions
sented in Volumes 2 and 3 are described and evaluated. Res
of the CRASH (Calspan Reconstruction of Accident Speeds
the Highway) II program were judged on their degree of co
spondence with the measured impact speeds and change
velocity. Reconstructions using the SMAC (Simulation M
of Automobile Collisions) program were assessed on the basi
the accuracy of the predicted final rest positions, damage dim
sions, and changes in velocity. On the whole, the results f
both the reconstruction programs were satisfactory. Recomm
dations are made to update representative values of veh
characteristics used in the CRASH II program; to add a sta
ary vehicle option to the CRASH program; to simulate
points and corner effects in the SMAC program; and to pro
an option to input tire cornering stiffness time history da
order to simulate weight transfer effects.

by Ian S. Jones; A. S. Baum
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-7-01511
Rept. No. ZQ-6057-*V-6 ; 1978 ; 185p
Rept. for Jun 1977-Dec 1978. Vol. 1-3 are HS-805 037--HS-805 039.
Availability: NTIS

HS-805 046

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT

Results are summarized of a detailed review of existing experimental data from staged automobile collisions, with long range plans to meet future data needs in relation to computer aids for reconstruction of highway accidents. A total of 141 staged collisions involving 170 individual vehicles with usable damage information were reviewed. The experimental damage data were coded and entered in a computerized data bank which was developed within the research program. Only seven staged collisions were found to include usable documentation of data from the spinout trajectories of the vehicles. Detailed plans are presented for application of the developed data bank. A sample application to refine the empirical structural crush tables of the CRASH program is included in the report. All data collected within the research program are appended.

by Raymond R. McHenry; James P. Lynch; David J. Segal
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DOT-HS-7-01511
Rept. No. ZQ-6057-*V-1 ; 1977 ; 116p 65refs
Rept. for Dec 1976-Jun 1977.
Availability: NTIS

HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT

The final report is presented of the Phase III program to study the potential application of an anticipatory radar braking system in preventing motor vehicle accidents. The design of the experimental radar braking system by Bendix Res. Labs. is described, including the installation of the system on two test vehicles. A summary of the functional tests which demonstrate the performance of the experimental system is also included. The system description follows an introductory general discussion (section 1). Section 2 outlines the design of the radar sensor, including the signal processing electronics, control panel display, and installation of the entire subsystem on the test vehicles. Sections 3 and 4 describe the design of the brake actuation subsystem and the anti-lock subsystem, respectively, and include information about installation of these two subsystems on test vehicles. Section 5 outlines functional tests conducted with the two test vehicles equipped with the radar braking system which demonstrate system performance. In addition to general observations about closed-loop braking performance of the two radar-brake-equipped test vehicles, Section 6 outlines the major differences in performance between the two test vehicles. More extensive tests of the radar braking system installed in the test vehicles are recommended. A test plan, separate from this report, has been submitted.

by William R. Faris; Carl P. Tresselt; Henry C. Yee
Bendix Corp., Bendix Res. Labs., Southfield, Mich. 48076
DOT-HS-6-01450
Rept. No. 8904 ; 1979 ; 249p 7refs
Rept. for Sep 1976-May 1979.
Availability: NTIS

HS-805 050

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT

A prototype Collision Avoidance Radar Braking System was installed on two vehicles and limited performance testing was carried out; further testing under varying conditions is required. Test methodology is described: parameters such as system sensitivity, dynamic braking performance on curves, and performance in the presence of precipitation are recommended for testing in a controlled test-track environment and in highway driving. Test-track requirements and target profiles (both simulated and real) are described. Recommended test instrumentation is described and data collection procedures outlined, including order of testing, number of runs, recorder speed, correlation with visual observations, and speed and brake temperature measurement. The continued test program should cover approximately eight months; a schedule for specific tests is suggested.

by William R. Faris
Bendix Corp., Bendix Res. Labs., Southfield, Mich. 48076
DOT-HS-6-01450
Rept. No. 8940 ; 1979 ; 25p 3refs
Rept. for Sep 1976-May 1979.
Availability: NTIS

HS-805 051

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS

The initial phase is described of a two-phase project designed to develop and test procedures for enhancing on-the-road detection of driving while intoxicated (DWI). The emphasis of the first phase was on the identification of visual cues and the development of procedures that effectively discriminate between DWI and driving while sober (DWS). The literature was reviewed, expert opinion was surveyed, 1288 DWI arrest reports were analyzed, and an on-the-road detection study was conducted in which trained observers accompanied police officers on patrol and recorded 643 instances of driving behavior and vehicle actions that deviated from normal. In each instance, the patrol officer stopped the vehicle and measured the blood alcohol concentration (BAC) of the driver with a portable breath tester. A DWI detection guide was developed to facilitate the application of research findings to the on-the-road detection of DWI by police patrol officers. The guide consists of 23 visual cues, a value for each cue reflecting the ability of the cue to discriminate between DWI and DWS, and a set of three rules for estimating the probability of DWI for any set of observed cues. The 23 cues accounted for 92 percent of the cues observed during the detection study. It was concluded that alcohol-induced driver impairment is exhibited mainly in steering and velocity control, time-sharing of attention, and information processing. Development of the detection guide was governed by the following criteria: to account for the largest number of detection events with the smallest number of detection cues; to enhance the discriminability of available cues; to employ a probabilistic output; to accommodate multiple-cue occurrences; to accommodate alternative enforcement statutes, policies, and strategies; and to emphasize simplicity, practicality, and ease of use. Prior to making the guide generally available or implementing its use on a wide scale, a field test is required to evaluate its effectiveness.

by Douglas H. Harris; James B. Howlett; R. Glen Ridgeway
Anacapa Sciences, Inc., P.O. Drawer Q, Santa Barbara, Calif. 93102
DOT-HS-7-01538
Rept. No. 321-1 ; 1979 ; 141p 25refs
Rept. for Mar 1977-Jan 1979.
Availability: NTIS

HS-805 053

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT

Sled tests (76) and car crash tests (7) were conducted to evolve production driver restraint systems for three Government furnished vehicles: 1976 Vega, Valiant, and Chevette. The effort was successful in providing 30-mph barrier equivalent velocity driver protection for all three vehicles. Resulting injury measurements were well within the limits set by the FMVSS 208 injury criteria. Protection was provided without changing the compartment interior geometry (except for the space required by the knee restraints), the column angle, or the driver's normal seating position. Although in the initial investigations the GM ACRS wheel and bag assembly (inflator, bag, cover) had been selected, it was later found necessary to substitute several system components to bring the vehicle systems into compliance with FMVSS injury criteria. The GM bag was modified to 120% of its original volume and an inflator with a correspondingly increased gas output was used. The stock energy absorbing steering column units of the Vega and Chevette were found to be too sensitive to the bending moments created by vertical loads at the wheel rim and were thus replaced by the Minicars tube/mandrel collapsible steering column, a system which easily satisfies industry standard torque criteria for steering columns. To assure controlled column collapse, the original column support bracketry was strengthened and molybdenum-impregnated nylon runners were installed. The appendix includes Vega sled test measurements and car crash tests, Valiant and Chevette sled tests, Chevette car crash tests, and oblique impact simulation for the Chevette. le,

by W. Broadhead; C. Strother
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01412
1978 ; 332p
Rept. for Aug 1976-Aug 1978. Vol. 1, Executive Summary, is HS-805 052; Vol. 3, Investigation of Potential Crash Survivability of a Current Production Subcompact Vehicle Equipped With an Advanced Driver Restraint System, is HS-805 054; Vol. 4, Evolving a Low Mount Passenger Air Cushion Restraint System (ACRS) For the Vega Subcompact Vehicle, is HS-805 055.

HS-805 062

EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT

Narrative summaries and tables describe a total 57 accidents involving air bag equipped cars, which were reported to NHTSA from 1 Sep 1977 through 31 Aug 1978 (33 deployment cases and 24 nondeployment cases). The information was extracted from the NHTSA in-depth reports by accident investigation teams from five regional research stations. In each case the following data are included: date, location, DOT HS number, type of accident, year and make of other vehicle(s) involved, speed of impact, driver and passenger(s) information, their injury codes, damage to the vehicles, and damage codes.

by Lotta Chi
Chi Associates, Inc., Suite 316, 1011 Arlington Blvd., Arlington, Va. 22209
NHTSA-9-6611
1979 ; 53p
Rept. for 1 Sep 1977 - 31 Aug 1978.
Availability: NTIS

HS-805 063

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT

A test methodology was devised for evaluating crash compatibility and aggressiveness of intermediate, subcompact anc lightweight subcompact cars. The NHTSA Test Device wa developed to measure the basic types of aggressiveness, namel architectural, mass and structural aggressiveness. The Tes Device is a unique segmented honeycomb load-measuring too which is adaptable to both moving barrier and fixed barrie collisions. The design criteria for the Test Device are summarized; results of eight car-to-Test Device collisions given; summary of the analysis and comparison of previous crash tes data presented; and methods discussed for assessing vehicl crash compatibility and aggressiveness.

by S. Davis; R. Yee
Dynamic Science, Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-7-01758
Rept. No. 8316-78-171A ; 1979 ; 40p 6refs
Rept. for Sep 1977-Dec 1978.
Availability: NTIS

HS-805 068

LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT

An analytical and experimental program was conducted t design a long life brake system for passenger vehicles whic would double the period between required servicing of conver tional systems. The design approach was to be compatible wit existing vehicle configurations and not to differ radically i braking principle. Formal objectives were: to analyze the stat of-the-art hydraulic brake systems, identifying system assembl and/or component design requirements which will assure a si nificant increase in service life without maintenance or repair and which will not affect safety, performance, or fuel econom to develop techniques which can be utilized objectively in qua tifying system durability and recommend procedures suitable f use in compliance testing. Service life was found initially to be defined by friction pair maintenance in the 30,000 to 40,000 mile range. Subsequent servicing requirements were necessitated by a number of mechanisms derived in large part from fluid degradation, metal corrosion, and rubber deterioration. A long life design approach was specified satisfying a doubled friction pair lifetime and a 100,000 mile balance of system service-free life. Component-by-component design approach alternatives were given and three test procedures described with which to evaluate compliance with the postulated standard: brake fluid specification modification, system isolation/cycling test, and dynamometer wear cycle. Benefit-cost analysis demonstrated that the benefits of reduced accidents and consumer maintenance outweigh the costs.

by R. Ziskind; I. Osofsky; Y. Mansoor; F. Oldham; D. Cout
Science Applications, Inc., 1801 Ave. of the Stars, Suite 1205,
Los Angeles, Calif. 90067
DOT-HS-7-01776
Rept. No. SAI-068-80-516 ; 1979 ; 36p 10refs
Rept. for Oct 1977-Mar 1979.
Availability: NTIS

HS-805 078

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

by Richard H. Klein; Jeffrey R. Hogue
Systems Technology, Inc., 13766 South Hawthorne, Blvd.,
Hawthorne, Calif. 90250
DOT-HS-7-01716
Rept. No. STI-TR-1117-1-*I ; 1979 ; 33p 10refs
Rept. for 30 Sep 1977-30 Mar 1979. For abstract, see Vol. 2,
HS-805 079.
Availability: NTIS

HS-805 136

CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL

The influence of safety information on the consumer's automobile purchase decision is discussed, with particular reference to the National Hwy. Traffic Safety Administration's (NHTSA) consumer information program as authorized by Title II of the Motor Vehicle Information and Cost Savings Act of 1972. This Act authorized NHTSA to rate the comparative performance of automobiles with respect to crashworthiness, damageability, and ease of maintenance, and to provide information on each of these factors to the public. Extensive studies conducted since the Act was implemented indicate that consumers say that they are concerned about vehicle safety, but that the vast majority assume that all cars within a size class are equally safe. A Dept. of Transportation-sponsored survey found that the public's understanding of technological alternatives that can improve safety is deep, and its desire for additional information strong, although to date the public has had little access to information about car differences. In view of the decreases in sales of Ford Pintos, Firestone 500 tires, and Chrysler's Omni/Horizon after national publicity about their safety problems, it is clear that consumers act upon safety information when it is provided. Manufactureres respond to this consumer behavior in their advertising. The government disseminates consumer information in order to have consumers react in the marketplace to safety differences and to encourage companies to respond to consumers' desire for safety by upgrading products. The question that remains to be answered is whether consumer information based on qualitative ratings of the relative crashworthiness of cars creates the same reaction as well-publicized, life-threatening situations. This is a question NHTSA hopes to answer in developing its automotive ratings program.

by Michael M. Finkelstein
National Hwy. Traffic Safety Administration, Washington, D.C.
20590
Publ: HS-804 786 (DOT-TSC-NHTSA-79-33), "Workshops on
Technological Change in the U.S. Automobile Industry and
Symposium on Technology, Government and the Automotive
Future Proceedings," Washington, D.C., 1979 p87-99
1979 ; 12refs
Presented at Symposium, Cambridge, Mass., 20 Oct 1978.
Availability: In HS-804 786

HS-810 352

REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY

At least six forces influence the rate of auto industry innovation as well as its focus, often interacting: internal stimulus; market structure; inventions; independent research; public expectations or crises; and government regulation. Since the 1930's, innovations in the auto industry have chiefly been those that benefit the manufacturer rather than the purchaser. Large auto companies tend to rely for advances in technology on their suppliers, whose research and development is rigidly constrained by the priorities of the giant manufacturers. The Office of Management and Budget urges Federal support of small business through the contracting and procurement process. Firms with less than 1,000 employees accounted for almost 1/2 of major U.S. innovations during 1953-73. Product competition based on technological advances has been abandoned by manufacturers in favor of the model year change, based on styling, and dealer-franchising policies--disincentives to innovation. Health and safety developments may be repressed by industry opposition, and inventions of safety and emission equipment shelved. Research by independent organizations and Government stimulates innovation by identifying critical problems and developing new concepts or hardware. Experimental safety vehicle program work was unsuccessfully attempted by domestic industry, yet satisfactory safety vehicles were produced through foreign industry. DOT is working on two new vehicles, small in weight, high in fuel economy, and with 40 to 50 mph crash survivability characteristics. The Insurance Institute for Highway Safety has played a major role in reducing vehicle damageability, developing an independent data system based on insurance industry information, and seeking the recall of defective vehicles. Consumer expectations have focussed in the past decade on safety and fuel economy. Future trends may be affected by the current overall reduction in the commitment of resources to civilian research and development, both in industry and government. High inflation and interest rates discourage investment in long-term research projects, but safety, conservation, health, and environmental regulatory programs contribute to control of inflation.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C.
20590
1978 ; 30p 19refs
Presented at Symposium on Technology, Government and the
Automotive Future, Cambridge, Mass., 20 Oct 1978. Also in
HS-804 736
Availability: Corporate author

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INDEX to ABSTRACTS

blank page

KWOC Title Index

ABSORBERS

ACCIDENT INVESTIGATION--WHO CHECKS THE SHOCK ABSORBERS
HS-026 109

ACCUMULATION

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT
HS-026 350

ACHIEVES

GM ACHIEVES FUEL ECONOMY VIA SYSTEMS ANALYSIS
HS-026 307

ACRS

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

ACTION

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

ACTIVE

MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

THE POTENTIAL FOR ACTIVE SUSPENSION SYSTEMS
HS-026 331

ACTS

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

ADDITIVE

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

ADJUDICATION

ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

ADMINISTATIVE

ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

ADVICE

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

LEMON AID [ADVICE ON BUYING A USED CAR]
HS-026 299

AERODYNAMIC

AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS
HS-026 305

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

AGE

UNSAFE AT ANY AGE? CHILDREN AND CAR SAFETY
HS-026 121

AGENCY

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

AGGRESSIVENESS

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

AID

LEMON AID [ADVICE ON BUYING A USED CAR]
HS-026 299

AIDS

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT
HS-026 346

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL·REPORT
HS-026 350

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

AIR

EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT
HS-805 062

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

AIRBAG

AIRBAG GAS GENERANT SIDE EFFECTS STUDIED
HS-026 310

ALCOHOL

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

ALIGNMENT

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

ALKOHOLAUFFALLIGE

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

ALTERNATIVES

ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM
HS-026 094

ALUMINUM

PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS
HS-026 117

ANALYSES

ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

ANALYTIC

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

ANALYTICAL

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT
HS-026 346

ANALYZING

ANALYZING REGULATORY FAILURE: MIS
MATCHES, LESS RESTRICTIVE ALTERNATIVE
AND REFORM
HS-026 0

ANALYZING THE FEASIBILITY OF THE ADMINI
TATIVE ADJUDICATION OF TRAFFIC OFFENSE
VOL. 2. FINAL REPORT
HS-803 9

ANSWER

SILICONE BRAKE FLUID: ANSWER TO CORROSIO
HS-026 0

ANY

UNSAFE AT ANY AGE? CHILDREN AND CA
SAFETY
HS-026 1

APPRAISALS

APPRAISALS OF VISIBILITY ON LIGHTED DI
AND WET ROADS
HS-026 3

ARM

LABOUR-SAVING METHODS FOR COUNTING TRA
FIC MOVEMENTS AT THREE-AND FOUR-AI
JUNCTIONS
HS-026

ARRESTED

CLASSIFICATION OF MEN ARRESTED FOR DRI
ING WHILE INTOXICATED, AND TREATMENT I
PLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026

ASSEMBLIES

ANALYSES OF SELECTED AUTOMOTIVE PAR
AND ASSEMBLIES FOR COST AND MATERIAL I
PACTS. FINAL REPORT
HS-803

ASSESSING

ASSESSING THE NATIONAL 55 M.P.H. SPEED LIM
HS-026

ASSESSMENT

AN INITIAL ASSESSMENT OF THE LITERATU
ON THE MEASUREMENT, CONTROL TRANSPO
TRANSFORMATION AND HEALTH EFFECTS
UNREGULATED DIESEL ENGINE EMISIONS. FIN
REPORT
HS-804

FINAL ASSESSMENT OF THE BUMPER STANDA
HS-804

FINAL ASSESSMENT OF THE BUMPER STANDA
EXECUTIVE SUMMARY
HS-804

ASSISTANCE

THE SURFACE TRANSPORTATION, ASSISTAN
ACT OF 1978
HS-026

ASSOCIATED

INSTALLATION AND DESIGN PROBLEMS ASS
ATED WITH THE AUTOMOTIVE TURBOCHAR
HS-026

ASSOCIATION

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

ATF

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

ATTITUDES

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

AUDIO

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

AUFFALLIGER

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

AUSTRALIA

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

AUTO

BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO
HS-027 365

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

AUTOCRACY

BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO
HS-027 365

AUTOMATED

A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS
HS-026 382

AUTOMATIC

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

AUTOMOBILE

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS
HS-026 342

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY
HS-810 352

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

THE UNITED KINGDOM AUTOMOBILE INSURANCE MARKET. FINAL REPORT
HS-804 151

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

25 ANTI-THEFT IDEAS [AUTOMOBILE PROTECTION]
HS-026 318

AUTOMOBILES

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

AUTOMOTIVE

ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

AUTOMOTIVE SAFETY--THE NEED TO KNOW
HS-026 116

AUTOMOTIVE TECHNOLOGY PROJECTIONS
HS-026 286

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

INTERNATIONAL COMPETITION IN THE WORLD AUTOMOTIVE INDUSTRY
HS-027 367

PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS
HS-026 117

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

AVAILABILITY

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

AVOIDANCE

ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS
HS-026 295

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT
HS-805 050

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

AXLE

STEP TO THE REAR [REAR AXLE SERVICING]
HS-026 372

BACKGROUND

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

BAG

EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT
HS-805 062

BANK

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

BASE

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

BEAD

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

BEHAVIOR

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

BELT

THE SPECTRUM OF SEAT BELT INJURIES
HS-026 083

BENZ

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

BIBLIOGRAPHY

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT
HS-026 346

BICYCLE

EUROPEAN BICYCLE SAFETY METHODS. THE WEST GERMAN WAY
HS-026 102

NATIONAL TRENDS IN BICYCLE ACCIDENTS
HS-026 091

BICYCLIST

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

BIKE

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

BIORHYTHMS

BIORHYTHMS AND TRAFFIC ACCIDENTS
HS-026 090

BISHERIGE

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

BLOCKIERVERHALTEN

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

BLOWING

MEASURING VISIBILITY IN BLOWING SNOW
HS-026 086

BODY

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

BOOSTS

AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS
HS-026 305

BOYS

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

BRAKE

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS
HS-026 309

LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

SILICONE BRAKE FLUID: ANSWER TO CORROSION
HS-026 084

BRAKING

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT
HS-805 050

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

BREMSSYSTEMEN

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

BRIDGING

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

BRITAIN

TRANSPORT STATISTICS GREAT BRITAIN 1967-1977
HS-026 082

BUILDS

CHEVROLET DESIGNS AND BUILDS A NEW V-6
HS-026 306

BUMPER

FINAL ASSESSMENT OF THE BUMPER STANDARD
HS-804 718

FINAL ASSESSMENT OF THE BUMPER STANDARD. EXECUTIVE SUMMARY
HS-804 719

BUS

DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT
HS-026 097

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT
HS-804 026

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

BUYING

LEMON AID [ADVICE ON BUYING A USED CAR]
HS-026 299

CADILLAC

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

CALENDAR

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

CAR

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

CAR REAR IMPACTS AND THE NEED FOR HEADREST
HS-026 110

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

LEMON AID [ADVICE ON BUYING A USED CAR]
HS-026 299

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

SMALL CAR SAFETY IN BIG-CAR COUNTRY
HS-026 287

UNSAFE AT ANY AGE? CHILDREN AND CAR SAFETY
HS-026 121

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

CARRIAGE

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

CARS

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

THE ELECTRICS ARE COMING! [ELECTRIC CARS]
HS-026 101

CENTRIFUGAL

CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

CHARACTERISTICS

ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS
HS-026 295

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS
HS-026 309

THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

CHECKS

ACCIDENT INVESTIGATION--WHO CHECKS THE SHOCK ABSORBERS
HS-026 109

CHESWICK

SILENCER DEVELOPMENT AT TI CHESWICK SILENCERS [MUFFLERS]
HS-026 365

CHEVETTE

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

CHEVROLET

CHEVROLET DESIGNS AND BUILDS A NEW V-6
HS-026 306

CHILD

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

CHILDREN

CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

UNSAFE AT ANY AGE? CHILDREN AND CAR SAFETY
HS-026 121

CLASSIFICATION

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

CLOSING

CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM]
HS-026 373

CLUB

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

CLUSTER

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

CLUTCH

FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS
HS-026 309

COIL

COIL SPRING SERVICE
HS-026 371

COLLISION

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT
HS-805 050

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

COLLISIONS

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

COMPARISON

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

COMPATIBILTY

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

COMPETITION

INTERNATIONAL COMPETITION IN THE WORLD AUTOMOTIVE INDUSTRY
HS-027 367

COMPLIANCE

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT
HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT
HS-803 992

COMPONENTS

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

COMPREHENSION

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

COMPRESSOR

CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

COMPTROLLER
THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

COMPUTER
RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

CONDUCTORS
FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

CONFIGURATIONS
ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS
HS-026 295

CONFIRM
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

CONGRESS
THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

CONNECTING
SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

CONNECTORS
FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

CONSIDERATION
A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

CONSTRUCTION
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

CONSUMERS
LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

CONTROL
"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL
HS-026 383

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL, TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM]
HS-026 373

FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

CORROSION
SILICONE BRAKE FLUID: ANSWER TO CORROSION
HS-026 084

COST
ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

COSTS
RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP
HS-026 100

COUNCIL
THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

COUNTERMEASURE

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

COUNTERMEASURES

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

COUNTING

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

COUNTRY

SMALL CAR SAFETY IN BIG-CAR COUNTRY
HS-026 287

COURSE

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

EMERGENCY VEHICLE OPERATIONS COURSE
HS-026 332

COURT

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

CPIR

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

CRASH

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

CRASHER

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

CRASHES

CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

CRIMINALITY

AN ALTERNATIVE TO THE CRIMINALITY OF DRIVING WHILE INTOXICATED
HS-026 323

CROOKS

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

CROSSING

MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

RAILROAD CROSSING SAFETY
HS-026 081

CROSSWALK

ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

CUES

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

CUSHION

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

CUTLASS

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

CYCLE

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

TURBOCHARGING FOUR-CYCLE DIESEL ENGINES
HS-026 355

CYCLIST

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

DAKOTA

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

DEATH

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

DECISION
THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

DEMAND
SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

DEMONSTRATION
PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

DERIVATION
SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

DESIGN
AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS
HS-026 305

INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

DESIGNER
PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER
HS-026 292

DESIGNS
CHEVROLET DESIGNS AND BUILDS A NEW V-6
HS-026 306

DETECTION
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

DETERRENCE
SYSTEM ANALYSIS OF THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED
HS-026 087

DEVICES
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

DEXTRON
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

DIESEL
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF

UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

AN UNCOOLED, UNLUBRICATED DIESEL?
HS-026 308

DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT
HS-026 097

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE
HS-026 364

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

TURBOCHARGING FOUR-CYCLE DIESEL ENGINES
HS-026 355

VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

DIESELS

DIESELS AND FOUR-WHEEL DRIVE
HS-026 330

DIFFICULT

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

DIGITAL

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

DILEMMA

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

DIRECTIONAL

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES
HS-026 289

DISHONEST

ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

DISPLACEMENT

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

DISTURBANCE

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

DODGE

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

DOUBLE

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

DOUBLES

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

DPMAS

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

DRIVE

DIESELS AND FOUR-WHEEL DRIVE
HS-026 330

FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS
HS-026 114

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

DRIVER

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH

ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?
HS-026 108

DRIVERS

A PLAGUE ON THESE PESTS [INCONSIDERATE/UNSAFE DRIVERS]
HS-026 088

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

DRIVETRAIN

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

DRIVING

A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]
HS-026 300

AN ALTERNATIVE TO THE CRIMINALITY OF DRIVING WHILE INTOXICATED
HS-026 323

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

SYSTEM ANALYSIS OF THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED
HS-026 087

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

DROP

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

DRY

APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS
HS-026 377

DUTY

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

DWINDLE

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

DYNAMIC

EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

DYNAMICS

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 1: SUMMARY TECHNICAL REPORT. FINAL REPORT HS-804 910

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES HS-026 289

SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS HS-026 290

ECONOMY

AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS HS-026 305

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984 HS-804 759

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985 A REVIEW AND RECOMMENDATIONS HS-026 342

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984 HS-804 186

GM ACHIEVES FUEL ECONOMY VIA SYSTEMS ANALYSIS HS-026 307

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY HS-027 364

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1. HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT HS-803 855

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY HS-026 353

EFFECTIVE

TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION HS-027 366

EFFICIENCY

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE HS-026 360

EINEM

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER) HS-026 376

ELDERLY

TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS HS-026 345

ELDORADO

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS HS-026 317

ELECTRIC

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT HS-026 096

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES HS-026 095

THE ELECTRICS ARE COMING! [ELECTRIC CARS] HS-026 101

ELECTRICS

THE ELECTRICS ARE COMING! [ELECTRIC CARS] HS-026 101

ELECTRONIC

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS HS-026 370

CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM] HS-026 373

EMERGENCY

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED. HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED. HS-803 444

EMERGENCY VEHICLE OPERATIONS COURSE HS-026 332

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC HS-804 757

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES HS-026 093

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT HS-804 095

EMISIONS

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT HS-804 010

EMISSION

CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM] HS-026 373

HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

EMISSIONS

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

FUEL HOSE PERMEATION: AN EMISSIONS PROBLEM?
HS-026 311

EMPLOYING

A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

ENFORCEMENT

STANDARDS ENFORCEMENT TEST REPORTS INDEX FOR 1978
HS-803 895

ENGINE

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE
HS-026 364

SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

ENGINEERING

ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

ENGINES

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

TURBOCHARGERS AND TURBOCHARGED ENGINES
HS-026 352

TURBOCHARGING FOUR-CYCLE DIESEL ENGINES
HS-026 355

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

ENOUGH

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

ENTERPRISES

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

ENVIRONMENT

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

ENVIRONMENTAL

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

EPA

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

EQUIPMENT

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

ERFAHRUNGEN

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

ERSTE

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

ESTIMATES

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

EUROPEAN

EUROPEAN BICYCLE SAFETY METHODS. THE WEST GERMAN WAY
HS-026 102

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

EVALUATION

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

EXAM

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?
HS-026 108

EXAMINERS

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

EXECUTIVE

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT
HS-805 062

FINAL ASSESSMENT OF THE BUMPER STANDARD. EXECUTIVE SUMMARY
HS-804 719

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

EXHAUST

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

EXPENSE

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

EXPERIMENTAL

EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE
HS-026 293

EXTRICATION

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

FABRICATION

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

FAILURE

ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM
HS-026 094

FEASIBILITY

ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

FEDERAL

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

FEMALE

SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

FHWA

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

FIBER

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

FIELD

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT
HS-805 062

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

FISCAL

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

FIXED

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

FLAMMABLE

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

FLAT

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

FLOW

ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE
HS-026 363

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

FLUID

FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

SILICONE BRAKE FLUID: ANSWER TO CORROSION
HS-026 084

FLUIDS

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

FOG
TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

FOLLOWER
"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL
HS-026 383

FRICTION
FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS
HS-026 309

FRINGE
SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

FRONT
FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS
HS-026 114

FUEL
AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS
HS-026 305

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS
HS-026 342

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

FUEL HOSE PERMEATION: AN EMISSIONS PROBLEM?
HS-026 311

GM ACHIEVES FUEL ECONOMY VIA SYSTEMS ANALYSIS
HS-026 307

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

FULL
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

FUNCTION
THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

FUNDAMENTAL
A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

GAP
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

GAS
AIRBAG GAS GENERANT SIDE EFFECTS STUDIED
HS-026 310

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

GASOLINE
NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

GENERANT
AIRBAG GAS GENERANT SIDE EFFECTS STUDIED
HS-026 310

GEORGIA
HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

GERMAN
EUROPEAN BICYCLE SAFETY METHODS. THE WEST GERMAN WAY
HS-026 102

GOVERNMENT
CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL
HS-805 136

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

GRADE
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

GRAPHITE
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

GRFRP
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

GRUNDLAGEN
DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

GUIDELINES
ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

HAND
SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

HANDBOOK
FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

HANDICAPPED
TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS
HS-026 345

HANDLE
A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]
HS-026 300

HANDLING
ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 1: SUMMARY TECHNICAL REPORT. FINAL REPORT
HS-804 910

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES
HS-026 289

HARDWARE
NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

HAZARDOUS
A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]
HS-026 300

HEAD
CAR REAR IMPACTS AND THE NEED FOR HEADREST
HS-026 110

HEADGEAR
EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

HEADWAY
A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS
HS-026 382

HEALTH
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?
HS-026 108

HEAVY
HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

HELMET
HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

HELMHOLTZ
HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE
HS-026 364

HELP

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

HIGHER

A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]
HS-026 300

HIGHWAY

A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS
HS-026 382

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

HIGHWAYS

TRAFFIC ON UTAH HIGHWAYS 1978
HS-026 313

HIRE

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

HISTORICAL

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

HISTORY

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

HITCH

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

HOLD

TURBOCHARGING: WHAT DOES THE FUTURE HOLD?
HS-026 304

HOSE

FUEL HOSE PERMEATION: AN EMISSIONS PROBLEM?
HS-026 311

HURT

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

HYDRAULIC

LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

IDEAS

25 ANTI-THEFT IDEAS [AUTOMOBILE PROTECTION]
HS-026 318

IDENTIFICATION

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

IGNITION

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

IMPACT

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

IMPACTS

ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

CAR REAR IMPACTS AND THE NEED FOR HEADREST
HS-026 110

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

IMPLEMENTATION

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS

1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

IMPLICATIONS

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

IMPORTANCE

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

IMPROVE

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

IMPROVEMENT

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

IMPROVEMENTS

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

IMPROVING

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

INCONSIDERATE

A PLAGUE ON THESE PESTS [INCONSIDERATE/UNSAFE DRIVERS]
HS-026 088

INDEX

STANDARDS ENFORCEMENT TEST REPORTS INDEX FOR 1978
HS-803 895

INDUCED

ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

INDUCTION

HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE
HS-026 364

INDUSTRIAL

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

INDUSTRY

INTERNATIONAL COMPETITION IN THE WORLD AUTOMOTIVE INDUSTRY
HS-027 367

REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY
HS-810 352

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

INFLATABLE

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

INFORMATION

CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL
HS-805 136

FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

INJECTION

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

INJURIES

THE SPECTRUM OF SEAT BELT INJURIES
HS-026 083

INJURY

RECENT TRENDS IN TRAFFIC INJURY
HS-026 314

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

INNOVATION

REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY
HS-810 352

INPUT

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

INSET

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

INSTALLATION

INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

INSTITUTE

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

INSTRUCTOR

CRASH VICTIM EXTRICATION TRAINING COURS
EMERGENCY MEDICAL TECHNICIAN. INSTRUC
TOR'S MANUEL. REV. ED.
HS-803 44

THE NSC [NATIONAL SAFETY COUNCIL] BIKE IN
STRUCTOR SEMINAR: HELP FOR THE ROAD'
MOST VULNERABLE USERS
HS-026 10

INSURANCE

INSTITUTE URGES ACTION FOR CHILD PROTEC
TION [INSURANCE INSTITUTE FOR HIGHWA
SAFETY, CHILD, RESTRAINTS]
HS-026 3

THE UNITED KINGDOM AUTOMOBILE INSURANC
MARKET. FINAL REPORT
HS-804 1

INTERIM

DEVELOPMENT OF COMPLIANCE TEST FO
TRUCK REAR UNDERRIDE PROTECTION. TASK
REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERI
REPORT
HS-803 9

DEVELOPMENT OF COMPLIANCE TEST FO
TRUCK REAR UNDERRIDE PROTECTION. TASK
TEST REPORT. INTERIM REPORT
HS-803 9

DEVELOPMENT OF COMPLIANCE TEST FO
TRUCK REAR UNDERRIDE PROTECTION. TASK
TEST REPORT, INTERIM REPORT
HS-803 9

FUNDAMENTAL STUDIES IN AUTOMATIC VEH
CLE CONTROL. INTERIM REPORT
HS-026 3

JUVENILE COURT ALCOHOL SCHOOL EVALUA
TION. INTERIM REPORT, SEPTEMBER 29, 1976 T
JUNE 1, 1977
HS-803 8

RESEARCH INPUT FOR COMPUTER SIMULATIO
OF AUTOMOBILE COLLISIONS. INTERIM REPOR
HS-805 0

STUDY AND TEST TO CONFIRM AUTOMOBILE DR
VETRAIN COMPONENTS TO IMPROVE FUEL ECON
OMY. VOL. 1, HISTORY OF THE AUTOMOBIL
TRANSMISSION IN THE UNITED STATES. INTERI
REPORT
HS-803 8

VISUAL DETECTION OF DRIVING WHILE INTOX
CATED. PROJECT INTERIM REPORT: IDENTIFICA
TION OF VISUAL CUES AND DEVELOPMENT O
DETECTION METHODS
HS-805 0

INTERNATIONAL

INTERNATIONAL COMPETITION IN THE WORL
AUTOMOTIVE INDUSTRY
HS-027 3

INTOXICATED

AN ALTERNATIVE TO THE CRIMINALITY O
DRIVING WHILE INTOXICATED
HS-026 3

CLASSIFICATION OF MEN ARRESTED FOR DRIV
ING WHILE INTOXICATED, AND TREATMENT IM
PLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 34

SYSTEM ANALYSIS OF THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED
HS-026 087

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

INVESTIGATION

ACCIDENT INVESTIGATION--WHO CHECKS THE SHOCK ABSORBERS
HS-026 109

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT
HS-805 050

EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

INVOLVEMENT

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

IRON

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

ISSUE

CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

ISSUING

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

JUNCTIONS

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

JUVENILE

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

KANSAS

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

KINGDOM

THE UNITED KINGDOM AUTOMOBILE INSURANCE MARKET. FINAL REPORT
HS-804 151

KRAFTFAHRER

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

LABOUR

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

LAW

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

LAWS

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

LEGAL

MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

LEGIBILITY

THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

LEGISLATED

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

LEMON

LEMON AID [ADVICE ON BUYING A USED CAR]
HS-026 299

LET

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

LIABILITY

PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER
HS-026 292

LICENSE

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?
HS-026 108

LICENSES

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

LICENSING

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

LIFE

LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

LIGHT

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS
HS-026 114

LIGHTED

APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS
HS-026 377

LIGHTING

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

LIGHTS

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

LIMIT

ASSESSING THE NATIONAL 55 M.P.H. SPEED LIMIT
HS-026 387

LIMITED

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

LINKS

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

LIQUIDS

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

LITERATURE

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

LITTLE

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

LIVES

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

LOCKING

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

LONG

LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

LOOP

CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM]
HS-026 373

LUBRICANT

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

LUMINANCE

THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

MAIN
EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

MANAGEMENT
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

MANDATED
MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

MANDATORY
IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

MANEUVER
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT
HS-804 093

MANUAL
CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

MANUEL
CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

MANUFACTURING
SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

MARKET
THE UNITED KINGDOM AUTOMOBILE INSURANCE MARKET. FINAL REPORT
HS-804 151

MATERIAL
ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

MATERIALS
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.
HS-804 026

MAXIMUM
ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

MEASUREMENT
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

MEASUREMENTS
TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

MEASURES
PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

MEASURING
MEASURING VISIBILITY IN BLOWING SNOW
HS-026 086

MECHANISM
A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

MEDICAL
CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

MEN
CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

MERCEDES
FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

MESSAGES

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

METHODOLOGY

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT
HS-026 350

METHODS

EUROPEAN BICYCLE SAFETY METHODS. THE WEST GERMAN WAY
HS-026 102

EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

MICHIGAN

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

MICROPROCESSOR

A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION
HS-026 301

MICROPROCESSORS

A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

MINNESOTA

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

MISMATCHES

ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM
HS-026 094

MISUSE

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

MOBILE

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

MODEL

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

MODIFIERS

FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS
HS-026 309

MOLDING

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

MOPED

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES
HS-026 289

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

MOTOR

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

MOTORCYCLE

ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS
HS-026 295

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 1: SUMMARY TECHNICAL REPORT. FINAL REPORT
HS-804 910

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE
HS-026 293

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER
HS-026 292

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

MOTORCYCLES

EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

MOTORCYCLING

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

MOTORCYCLISTS

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

MOTORIST

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

MOTORISTS

MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

MOTORRADERN

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

MOUNT

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

MOVEMENTS

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

MPH

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

MUFFLERS

SILENCER DEVELOPMENT AT TI CHESWICK SILENCERS [MUFFLERS]
HS-026 365

MULTINATIONAL

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

MULTIPURPOSE

SAFETY OF MULTIPURPOSE VANS. SPECIAL STUDY
HS-026 119

NATIONAL

ASSESSING THE NATIONAL 55 M.P.H. SPEED LIMIT
HS-026 387

NATIONAL TRENDS IN BICYCLE ACCIDENTS
HS-026 091

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

NBR
NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

NETWORKS
ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

NIGHTTIME
THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

NOISE
FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

NONCOMPLIANCE
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

NOTES
THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

NSC
THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

OCCUPANCY
SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

OCCUPANT
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT
HS-804 026

OFFENDERS
INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

OFFENSES
ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

OIL
THE USED-OIL RECYCLING PROGRAM
HS-026 298

OLDSMOBILE
FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

OPERATIONS
A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS
HS-026 382

EMERGENCY VEHICLE OPERATIONS COURSE
HS-026 332

OPINION
ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

OPTIMUM
SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

ORGANIZATION
TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION
HS-027 366

OSTERKAMP
HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U S 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

OUTPUT
SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

OVERHEAD

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

OVERTURN

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

OVERVIEW

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

OWNERSHIP

RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP
HS-026 100

PARALLEL

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

PARAMETER

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

PARKING

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT
HS-026 350

PARTICULAR

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

PARTICULATE

HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

PARTS

ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

PATTERN

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

PAVEMENT

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

PEDESTRIAN

ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PERFORMANCE

DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT
HS-026 097

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE
HS-026 363

EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE
HS-026 293

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS
HS-026 117

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

PERMEATION

FUEL HOSE PERMEATION: AN EMISSIONS PROBLEM?
HS-026 311

PERSONALITY

SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

PESTS

A PLAGUE ON THESE PESTS [INCONSIDERATE/UNSAFE DRIVERS]
HS-026 088

PEUGEOT

FOUR DIESEL CARS: MERCEDES-BENZ 300D, CADILLAC ELDORADO, PEUGEOT 504, OLDSMOBILE CUTLASS
HS-026 317

PHOTOMETRIC

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

PIERCING

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

PLAGUE

A PLAGUE ON THESE PESTS [INCONSIDERATE/UNSAFE DRIVERS]
HS-026 088

PLAN

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

PLANNER

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

PLANNING

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

PLASTIC

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

POLICE

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

POLICY

A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS
HS-026 382

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL
HS-805 136

POLL

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

POPULATIONS

STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT
HS-803 656

POUND

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

PRACTICAL

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

PRACTICES

FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

PREDICTION

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

PREPARATION

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

PRESS

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

PRINCIPLES

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

PRIORITY

SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

PRIVATE

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

PROBLEM

FUEL HOSE PERMEATION: AN EMISSIONS PROBLEM?
HS-026 311

PROBLEMS

BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS
HS-026 345

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?
HS-026 108

PROCEDURES

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

PROCEEDINGS

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

PROCESS

SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

PROCESSING

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

PRODUCT

EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER
HS-026 292

PROGRAMM

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

PROJECT

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

PROJECTIONS

AUTOMOTIVE TECHNOLOGY PROJECTIONS
HS-026 286

PROPERTIES

EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

PROS

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

PROSPECTS

TURBOCHARGERS FOR THE 1980'S--CURRENT TRENDS AND FUTURE PROSPECTS
HS-026 358

PROTECTION

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT
HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT
HS-803 992

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

25 ANTI-THEFT IDEAS [AUTOMOBILE PROTECTION]
HS-026 318

PROTECTIVE

EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.
HS-804 026

PROXY

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

PUBLIC

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO
HS-027 365

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION
HS-027 366

PUBLICITY

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

PUCKER

A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]
HS-026 300

PULLING

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

PULSATING

ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE
HS-026 363

PUPIL

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

QUALITIES

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES

HS-026 289

RADAR

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT

HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT

HS-805 050

RADIATORS

PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS

HS-026 117

RADIO

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS

HS-026 316

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS

HS-026 344

RAILROAD

RAILROAD CROSSING SAFETY

HS-026 081

RAPID

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES

HS-026 080

RATES

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT

HS-803 894

REACTION

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY

HS-026 296

REAR

CAR REAR IMPACTS AND THE NEED FOR HEADREST

HS-026 110

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT

HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT

HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT

HS-803 992

STEP TO THE REAR [REAR AXLE SERVICING]

HS-026 372

RECENT

RECENT TRENDS IN TRAFFIC INJURY

HS-026 314

RECOMMENDATIONS

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS

HS-026 342

RECOMMENDED

FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.

HS-026 333

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.

HS-026 334

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.

HS-026 339

RECONSTRUCTIONS

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT

HS-805 040

RECREATIONAL

RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP

HS-026 100

RECYCLING

THE USED-OIL RECYCLING PROGRAM

HS-026 298

REDIRECT

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES

HS-026 095

REDUCE

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]

HS-026 338

REFLECTIVE

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT

HS-026 321

REFORM

ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM

HS-026 094

REFRESH

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]

HS-026 105

REGISTER

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

REGULATING

BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO
HS-027 365

REGULATION

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY
HS-810 352

TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION
HS-027 366

REGULATIONS

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

REGULATORY

ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM
HS-026 094

REINFORCED

FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

REPEAL

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

REQUIREMENT

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

REQUIREMENTS

MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

RESEARCH

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOP-

MENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

RSV [RESEARCH SAFETY VEHICLE] PHASE 3. PROGRESS REPORT NO. 12, DECEMBER 1978-JANUARY 1979
HS-804 189

RESISTANT

NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

REST

CAR REAR IMPACTS AND THE NEED FOR HEADREST
HS-026 110

RESTRAINT

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

RESTRAINTS

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

RESTRICTIVE

ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM
HS-026 094

RESULTS

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

RETROFIT

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.
HS-804 026

REVIEW

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS
HS-026 342

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

RIDE

SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

RIDERSHIP

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

RIPOFF

ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

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ROAD

A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

ROADS

APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS
HS-026 377

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

ROADSIDE

ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

ROD

SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

ROLL

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

ROLLOVER

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT
HS-804 093

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

ROOMINESS

AERODYNAMIC DESIGN BOOSTS FUEL ECONOMY AND ROOMINESS
HS-026 305

ROUTE

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

RRIM

WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

RSV

RSV [RESEARCH SAFETY VEHICLE] PHASE 3. PROGRESS REPORT NO. 12, DECEMBER 1978-JANUARY 1979
HS-804 189

RULEMAKING

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

RUN

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

RV

RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP
HS-026 100

SAFE

"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL
HS-026 383

THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

SAVES

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

SAVING

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

SCANNING

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

SCHEDULE

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

SCHOOL

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.
HS-804 026

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

SCIPIO

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

SCREEN

WHY NOT USE DRIVER LICENSE EXAM TO SCREEN FOR HEALTH PROBLEMS?
HS-026 108

SEAT

THE SPECTRUM OF SEAT BELT INJURIES
HS-026 083

SECTION

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

SELECTING

SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

SEMINAR

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

SERIES

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

SERVICE

COIL SPRING SERVICE
HS-026 371

ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

SERVICES

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS

1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

SERVICING

STEP TO THE REAR [REAR AXLE SERVICING]
HS-026 372

SHIFT

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

SHOCK

ACCIDENT INVESTIGATION--WHO CHECKS THE SHOCK ABSORBERS
HS-026 109

SHORT

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

SHOWING

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

SIDE

AIRBAG GAS GENERANT SIDE EFFECTS STUDIED
HS-026 310

SIDEWALL

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

SIGN

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

SIGNAL

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

SIGNALS

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

SIGNS

A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

SILENCER

SILENCER DEVELOPMENT AT TI CHESWICK SILENCERS [MUFFLERS]
HS-026 365

SILENCERS

SILENCER DEVELOPMENT AT TI CHESWICK SILENCERS [MUFFLERS]
HS-026 365

SILICONE

SILICONE BRAKE FLUID: ANSWER TO CORROSION
HS-026 084

SIMPLIFIED

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT
HS-026 346

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT
HS-026 350

SIMULATION

DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT
HS-026 097

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

SIMULATOR

A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

SITE

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

SITUATIONS

A PUCKER FACTOR HIGHER THAN SEVEN [HAZARDOUS DRIVING SITUATIONS AND HOW TO HANDLE THEM]
HS-026 300

SIZE

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

SMALL

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

SMALL CAR SAFETY IN BIG-CAR COUNTRY
HS-026 287

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

SNOW

MEASURING VISIBILITY IN BLOWING SNOW
HS-026 086

SOMETIMES

THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

SOUR

NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

SPARK

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

SPECIFIC

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

SPECTRUM

THE SPECTRUM OF SEAT BELT INJURIES
HS-026 083

SPEED

ASSESSING THE NATIONAL 55 M.P.H. SPEED LIMIT
HS-026 387

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

SPRING

COIL SPRING SERVICE
HS-026 371

STABILITY

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

STAGED

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

STANDARD

FINAL ASSESSMENT OF THE BUMPER STANDARD
HS-804 718

FINAL ASSESSMENT OF THE BUMPER STANDARD. EXECUTIVE SUMMARY
HS-804 719

STANDARDS

AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS
HS-026 342

FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

STANDARDS ENFORCEMENT TEST REPORTS INDEX FOR 1978
HS-803 895

STATES

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS–INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

STATIONS
ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

STATISTICAL
TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS–INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

STATISTICS
THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

TRANSPORT STATISTICS GREAT BRITAIN 1967-1977
HS-026 082

STEEL
IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

STEERING
EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE
HS-026 293

STEP
STEP TO THE REAR [REAR AXLE SERVICING]
HS-026 372

STOCHASTIC
STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT
HS-803 656

STORY
AUTOMOBILE EMISSIONS CONTROL POLICY–SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

STRATEGY
MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2–SPEED CONTROL STRATEGY
HS-026 379

STREET
ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

STRENGTHS
ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

STUDENT
CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

STUDIED
AIRBAG GAS GENERANT SIDE EFFECTS STUDIED
HS-026 310

SUBCOMPACT
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

SUMPLIFIED
SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

SUPPLEMENT
FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

SUPPLY
STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

SURFACE
THE SURFACE TRANSPORTATION, ASSISTANCE ACT OF 1978
HS-026 113

SURVEY
SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

SUSPENSION

THE POTENTIAL FOR ACTIVE SUSPENSION SYSTEMS HS-026 331

SYMBOLIC

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES HS-026 080

SYMPOSIUM

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT HS-804 786

TABULAR

EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT HS-805 062

TAILOR

FRICTION MODIFIERS TAILOR BRAKE AND CLUTCH CHARACTERISTICS HS-026 309

TANK

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS] HS-026 338

TASK

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT HS-803 992

TECHNICIAN

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED. HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED. HS-803 444

TECHNOLOGICAL

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT HS-804 786

TECHNOLOGY

AUTOMOTIVE TECHNOLOGY PROJECTIONS HS-026 286

WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT HS-804 786

TELLS

MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES" HS-026 107

TEMPERATURE

NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE HS-026 374

TERM

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS HS-026 316

TEST

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT HS-805 063

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT HS-805 078

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT HS-803 992

ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST] HS-026 319

EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR HS-026 092

SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS HS-026 326

STANDARDS ENFORCEMENT TEST REPORTS INDEX FOR 1978 HS-803 895

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT HS-803 855

TESTING

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

TESTS

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990

LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

THEFT

25 ANTI-THEFT IDEAS [AUTOMOBILE PROTECTION]
HS-026 318

THEORETICAL

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

THEORETICSCHE

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

THRESHOLD

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

TI

SILENCER DEVELOPMENT AT TI CHESWICK SILENCERS [MUFFLERS]
HS-026 365

TIFTON

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

TINTED

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

TIPS

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

TIRE

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

TIRES

EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

TITLE

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL

YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

TOLL

HELMET LAWS DWINDLE: DEATH TOLL MOUNT [MOTORCYCLING]
HS-026 324

TOOL

CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL
HS-805 136

TRACTORS

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

TRADE

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

TRAFFIC

A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION
HS-026 301

A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

BIORHYTHMS AND TRAFFIC ACCIDENTS
HS-026 090

ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

RECENT TRENDS IN TRAFFIC INJURY
HS-026 314

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

TRAFFIC ON UTAH HIGHWAYS 1978
HS-026 313

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

TRAILER

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

TRAILERS

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

TESTING DOUBLES TRAILERS AT THE THRESHOLD OF ROLLOVER [TRACTORS PULLING TWO TRAILERS]
HS-026 337

TRAINING

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

TRANSFORMATION

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF

UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

TRANSIENT

EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

TRANSIT

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

TRANSMISSION

A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

TRANSMISSIONS

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

TRANSPORT

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

NEW HITCH HARDWARE LEGISLATED TO REDUCE DOUBLES ROLL, JACKKNIFE [TRANSPORT OF FLAMMABLE LIQUIDS IN DOUBLE TANK TRAILERS]
HS-026 338

TRANSPORT STATISTICS GREAT BRITAIN 1967-1977
HS-026 082

TRANSPORTATION

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT
HS-026 346

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT
HS-026 350

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

THE SURFACE TRANSPORTATION, ASSISTANCE ACT OF 1978
HS-026 113

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS
HS-026 345

TRAVEL

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

TREATMENT

CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

TRENDS

NATIONAL TRENDS IN BICYCLE ACCIDENTS
HS-026 091

RECENT TRENDS IN TRAFFIC INJURY
HS-026 314

STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

TURBOCHARGERS FOR THE 1980'S--CURRENT TRENDS AND FUTURE PROSPECTS HS-026 358

TRUCK

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT HS-803 992

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977 HS-026 329

TRUCKING

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977 HS-026 329

TRUCKS

FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS HS-026 114

TUNED

HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE HS-026 364

TURBINE

ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE HS-026 363

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE HS-026 360

TURBOCHARGED

EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL HS-026 357

HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE HS-026 364

TURBOCHARGERS AND TURBOCHARGED ENGINES HS-026 352

TURBOCHARGER

CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER HS-026 361

INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER HS-026 354

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE HS-026 360

TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS HS-026 356

VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES HS-026 359

TURBOCHARGERS

TURBOCHARGERS AND TURBOCHARGED ENGINES HS-026 352

TURBOCHARGERS FOR THE 1980'S--CURRENT TRENDS AND FUTURE PROSPECTS HS-026 358

TURBOCHARGING

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES HS-026 362

TURBOCHARGING FOUR-CYCLE DIESEL ENGINES HS-026 355

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY HS-026 353

TURBOCHARGING: WHAT DOES THE FUTURE HOLD? HS-026 304

TYPE

BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS] HS-026 285

TYPES

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN) HS-026 325

UNCONVENTIONAL

ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS HS-026 295

UNCOOLED

AN UNCOOLED, UNLUBRICATED DIESEL? HS-026 308

UNDERRIDE

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT
HS-803 992

UNITED

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

THE UNITED KINGDOM AUTOMOBILE INSURANCE MARKET. FINAL REPORT
HS-804 151

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

UNLUBRICATED

AN UNCOOLED, UNLUBRICATED DIESEL?
HS-026 308

UNREGULATED

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

UNSAFE

A PLAGUE ON THESE PESTS [INCONSIDERATE/ UNSAFE DRIVERS]
HS-026 088

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

UNSAFE AT ANY AGE? CHILDREN AND CAR SAFETY
HS-026 121

URBAN

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPERATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

URGES

INSTITUTE URGES ACTION FOR CHILD PROTECTION [INSURANCE INSTITUTE FOR HIGHWAY SAFETY, CHILD, RESTRAINTS]
HS-026 335

USAGE

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

USC

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RE-

SEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

USERS

THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

USES

RUN-FLAT TIRE USES DOUBLE BEAD, REINFORCED SIDEWALL
HS-026 312

UTAH

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

TRAFFIC ON UTAH HIGHWAYS 1978
HS-026 313

UTILIZATION

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

VACATION

VACATION PLANNER [CAR PREPARATION, TRAVEL PLANNING, AND DRIVING TIPS]
HS-026 336

VALIANT

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

VAN

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

VANS

SAFETY OF MULTIPURPOSE VANS. SPECIAL STUDY
HS-026 119

VARIABLE

CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

VARIABLES

SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

VEGA

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

VEHICLE

'SAFE-APPROACH' VEHICLE-FOLLOWER CONTROL
HS-026 383

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT
HS-804 093

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.
HS-804 722

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

EMERGENCY VEHICLE OPERATIONS COURSE
HS-026 332

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

RSV [RESEARCH SAFETY VEHICLE] PHASE 3. PROGRESS REPORT NO. 12, DECEMBER 1978-JANUARY 1979
HS-804 189

SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT
HS-803 656

THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

VEHICLES

RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP
HS-026 100

SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

VEHICULAR

A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

VEIL

PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

VERBAL

RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

VERBESSERUNG

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

VERKEHRSSTRAFTATER

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

VERKEHRSVERHALTENS

DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

VERSATILE

PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

VERSCHIEDENEN

BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

VIBRATION

ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

VICTIM

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

VIRGINIANS

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

VISIBILITY

APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS
HS-026 377

MEASURING VISIBILITY IN BLOWING SNOW
HS-026 086

VISUAL

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

VOLUME

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL

PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

VULCANIZATES
NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

VULNERABLE
THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

WARNING
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

WELL
TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.
HS-026 322

WET
APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS
HS-026 377

WHEEL
DIESELS AND FOUR-WHEEL DRIVE
HS-026 330

FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS
HS-026 114

LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

WINDSHIELD
TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

WORKSHOPS
WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

WORLD
INTERNATIONAL COMPETITION IN THE WORLD AUTOMOTIVE INDUSTRY
HS-027 367

WRONGHEADED
AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

YAWNING
ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

YOUNG
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

YPSILANTI
HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

ZONE
THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

ZONES
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

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Author Index

Abbott, [illegible]r.d.
NATIONAL TRENDS IN BICYCLE ACCIDENTS
HS-026 091

Abernathy, William J. , Ed.
WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

Alexander, Ralph A.
SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

Alter, Stewart
UNSAFE AT ANY AGE? CHILDREN AND CAR SAFETY
HS-026 121

Anderson, Robert L.
MINNESOTA TELLS PUBLIC: "REAL PROS DRIVE 55...SAVES GAS! SAVES LIVES"
HS-026 107

Andon, Jerar
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Aoki, Akira
EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE
HS-026 293

Baczynski, R.
DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT
HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT
HS-803 992

Baines, Thomas M.
HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

Barrett, General V.
SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

Barry, T. M.
FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

Bassoli, C.
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

Baum, A. S.
RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

Bauman, Richard
ROADSIDE RIPOFF [DISHONEST PRACTICES BY SERVICE STATIONS]
HS-026 297

Bellinger, T. p.
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

Berenyi, S. G.
VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

Berger, Robert E.
EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

Bernstein, Arthur
THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

Bevans, John P.
"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL
HS-026 383

Bevilacqua, G.
A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

Biaggini, G.
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

Black, Stephen H.
SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

Boughton, C.J.
THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

Brands, M. C.
HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE
HS-026 364

Breyer, Stephen
ANALYZING REGULATORY FAILURE: MISMATCHES, LESS RESTRICTIVE ALTERNATIVES, AND REFORM
HS-026 094

Broadhead, W.
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

Brown, David B.
PROXY MEASURES IN ACCIDENT COUNTERMEASURE EVALUATION: A STUDY OF EMERGENCY MEDICAL SERVICES
HS-026 093

Bryan, Norman , Jr.
A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

Bunch, Howard M.
STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT
HS-803 656

Burchman, Phyllis F.
MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

Burg, A.
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

Burke, A.
AUTOMOTIVE TECHNOLOGY PROJECTIONS
HS-026 286

Byrd, Roy N.
JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

Calvano, Nicholas J.
EVALUATION OF PRODUCT SAFETY TEST METHODS: PROTECTIVE HEADGEAR
HS-026 092

Carrier, Herb
LET'S REFRESH ON ALIGNMENT: 'CONSUMERS' VS. 'CROOKS' [WHEEL ALIGNMENT PRINCIPLES]
HS-026 105

Casey, G. L.
A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS
HS-026 370

Casner, Donald
A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

Chi, Lotta
EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT
HS-805 062

Chou, Cheng-Chien
THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

Clason, D.L.
PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

Claybrook, Joan
REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY
HS-810 352

Clotfelter, Charles T.
ASSESSING THE NATIONAL 55 M.P.H. SPEED LIMIT
HS-026 387

Coonley, Philip S.
MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

Cooper, Dale F.
A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION
HS-026 301

Cornetti, G. M.
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

Cout, D.
LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

Cox, R. G.
SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

Crombie, [illegible]d.d.
ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

Cropper, R.
DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990

Dardik, Herbert
THE SPECTRUM OF SEAT BELT INJURIES
HS-026 083

Davis, S.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AG-

GRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT
HS-803 991

DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT
HS-803 992

Deen, H.E.
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

Dempsey, Edward C.
STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370

Deuser, Robert
SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

Dewar, Robert E.
RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

DeLong, Fred
BIKE AND CAR ACCIDENTS: PROBLEMS AND COUNTERMEASURES. SOME PRACTICAL ADVICE FOR CYCLIST AND MOTORIST
HS-026 388

Di Lorenzo, A.
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

Dowdy, M.
AUTOMOTIVE TECHNOLOGY PROJECTIONS
HS-026 286

Dryden, Colin
A PLAGUE ON THESE PESTS [INCONSIDERATE/UNSAFE DRIVERS]
HS-026 088

Dunn, J. R.
NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

Edelstein, R.P.
ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

Ellingstad, V. S.
IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.
HS-803 960

Ellingstad, Vernon S.
IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

Ellis, Jerry G.
RAPID COMPREHENSION OF VERBAL AND SYMBOLIC TRAFFIC SIGN MESSAGES
HS-026 080

Ember, Lois
THE DIESEL DILEMMA; EPA'S ENVIRONMENTAL PROTECTION AGENCY DIFFICULT DECISION
HS-026 380

Emerton, Mark
CLOSING THE LOOP [ELECTRONIC EMISSION CONTROL SYSTEM]
HS-026 373

Emmenthal, K.-D.
TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

Faris, William R.
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT
HS-805 050

Fenton, R. E.
FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

Fenton, Robert E.
A HEADWAY SAFETY POLICY FOR AUTOMATED HIGHWAY OPERATIONS
HS-026 382

Filkins, Lyle D.
TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT
HS-026 085

Fine, Eric W.
CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

Finkelstein, Michael M.
CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL
HS-805 136

Fleming, D. M.
SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

Fleming, D.
THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

Flora, J.D.
NATIONAL TRENDS IN BICYCLE ACCIDENTS
HS-026 091

Flynn, Patrick F.
TURBOCHARGING FOUR-CYCLE DIESEL ENGINES
HS-026 355

Frey, Peter
25 ANTI-THEFT IDEAS [AUTOMOBILE PROTECTION]
HS-026 318

Gentile, Chris A.
EMERGENCY VEHICLE OPERATIONS COURSE
HS-026 332

Ginsburg, Douglas H. , Ed.
WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

Ginsburg, Marvin J.
MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

Glennon, John
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

Glimm, J.
FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

Glines, Stephen W.
JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977
HS-803 891

Goebel, Jay
TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

Golomb, D. Henry
STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT
HS-803 656

Gordon, P.
APPRAISALS OF VISIBILITY ON LIGHTED DRY AND WET ROADS
HS-026 377

Gott, P. G.
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

Gottesman, C. A.
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

Graham, Jerry
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

Green, F.B.
RV'S [RECREATIONAL VEHICLES]--THE COSTS OF OWNERSHIP
HS-026 100

Habib, P.A.
ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

Haeusler, Roy C.
AUTOMOTIVE SAFETY--THE NEED TO KNOW
HS-026 116

Hagemann, G.
TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

Hahn, John C.
ASSESSING THE NATIONAL 55 M.P.H. SPEED LIMIT
HS-026 387

Hall, Richard W.
AN ALTERNATIVE TO THE CRIMINALITY OF DRIVING WHILE INTOXICATED
HS-026 323

Harp, James L.
CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

Harris, [illegible]r.a.
RECENT TRENDS IN TRAFFIC INJURY
HS-026 314

Harris, Douglas H.
SYSTEM ANALYSIS OF THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED
HS-026 087
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICA-

TION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Hartley, John
DIESELS AND FOUR-WHEEL DRIVE
HS-026 330

Hartley, M. G.
A ROAD TRAFFIC SIMULATOR EMPLOYING MICROPROCESSORS
HS-026 303

Harvey, Craig A.
HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

Harwood, Douglas
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

Heckard, Margaret
CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

Hermanns, Martin J.
FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS
HS-026 114

Hogue, Jeffrey R.
DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

Howlett, James B.
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Hricko, Andrew R.
PIERCING THE DRIVER LICENSE VEIL [NON-USE OR MISUSE OF THE NATIONAL DRIVER REGISTER IN ISSUING LICENSES]
HS-026 368

Hucho, W.-H.
TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY
HS-026 353

Hulbert, S.
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

Huntchinson, T.P.
RECENT TRENDS IN TRAFFIC INJURY
HS-026 314

Hurter, D. A.
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT
HS-803 855

Ibraham, Ibraham M.
THE SPECTRUM OF SEAT BELT INJURIES
HS-026 083

Iijima, Hiromi
EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

Ishihara, Tomo-o
A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

Ito, Hiroshi
A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

Jackson, John E.
TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION
HS-027 366

James, Mike
STEP TO THE REAR [REAR AXLE SERVICING]
HS-026 372

Janicki, Ed
THE ELECTRICS ARE COMING! [ELECTRIC CARS]
HS-026 101

Japikse, David
TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS
HS-026 356

John, Richard R.
MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

Johnson, John H.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Johnston, I.R.
THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

Jones, Ian S.
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT
HS-804 093

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT
HS-805 040

Kahl, Paul K., Sr.
EUROPEAN BICYCLE SAFETY METHODS. THE WEST GERMAN WAY
HS-026 102

Kaiser, Kenneth F.
INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

Kanaya, Osamu
EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

Ketchum, Brian
BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO
HS-027 365

Kiefer, W. R.
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

King, William
PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS
HS-026 117

Klebel, E.
INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

Klein, Richard H.
DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

Klotz, Robert
A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

Knisley, Harold
A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

Larson, Glenn
DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT
HS-026 097

Lassiter, Donald V.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Last, J. David
SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

Leddy Cauwenberghe, David G.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Leone, Robert A.
TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION
HS-027 366

Liebe, H.J.
ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

Lummis, Michael L.
IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

Lupertz, Henning
BRAKING AND LOCKING CHARACTERISTICS OF VARIOUS TYPES OF MOTORCYCLE BRAKE SYSTEMS (BREMS- UND BLOCKIERVERHALTEN VON MOTORRADERN MIT VERSCHIEDENEN BREMSSYSTEMEN)
HS-026 325

Lynch, James P.
RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

Lynn, Cheryl
ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT
HS-026 384

MacTavish, Merry
THE CRASHER PAPERS: NOTES FROM THE DROP ZONE. SOMETIMES A LITTLE HURT CAN HELP [MOTORCYCLE ACCIDENT STATISTICS]
HS-026 099

Mansoor, Y.
LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

Marshall, M. L.
LABOUR-SAVING METHODS FOR COUNTING TRAFFIC MOVEMENTS AT THREE-AND FOUR-ARM JUNCTIONS
HS-026 302

Mason, Anthony K.
ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

Mayhan, R. J.
FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

Maynard, Dale A.
SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS
HS-026 327

McDaniel, Charles E.
EMERGENCY VEHICLE OPERATIONS COURSE
HS-026 332

McDowell, M. R. C.
A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION
HS-026 301

McHenry, Raymond R.
RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

McKibben, Jon S.
PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER
HS-026 292

Michalke, H.
INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

Mikulec, Michelle J.
WHAT'S NEEDED TO MAKE RRIM [REINFORCED REACTION INJECTION MOLDING] A BETTER BET FOR THE AUTO INDUSTRY
HS-026 296

Milby, Thomas H.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Miller, Craig
SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

Mills, A. L.
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

Miura, Toshiaki
MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Morita, takanobu
MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Murakami, Nobuo
MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Mycielska, Lala
BIORHYTHMS AND TRAFFIC ACCIDENTS
HS-026 090

Nagayama, Yasuhisa
MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Nahumck, ●w.m.
PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

Novi, Thomas J.
ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT
HS-803 974

Nwankwor, O.I.
ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

O'Halloran, R.
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

Oatway, Thomas P.
CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

Oldham, F.
LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

Olson, Paul L.
THE NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS AS A FUNCTION OF THEIR LUMINANCE CHARACTERISTICS
HS-026 079

Osofsky, I.
LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

Outten, ●e.f.
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

Overend, Robert B.
THE NSC [NATIONAL SAFETY COUNCIL] BIKE INSTRUCTOR SEMINAR: HELP FOR THE ROAD'S MOST VULNERABLE USERS
HS-026 106

Owen, Bruce R.
INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

Panek, Paul E.
SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

Paulsen, Robert
TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 1--PROBLEMS AND IMPROVEMENTS
HS-026 378

TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES. PT. 2--SPEED CONTROL STRATEGY
HS-026 379

Pearce, Michael C.
INTERNATIONAL COMPETITION IN THE WORLD AUTOMOTIVE INDUSTRY
HS-027 367

Pfisterer, H. A.
NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

Pinkwas, Stan
BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO
HS-027 365

Post, David V.
SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

Raffa, C. J.
VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

Reagan, J. A.
FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

Reichard, John
CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

Reinhardt, Robert W.
ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

Ricci, Robert C.
MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

Rice, Roy S.
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT
HS-804 093

Ridgeway, R. Glen
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Ridland, J. J.
NBR VULCANIZATES RESISTANT TO HIGH TEMPERATURE AND "SOUR" GASOLINE
HS-026 374

Rochford, Keith G.
SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

Rubinger, Bruce
MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY
HS-027 364

Rudder, F.F. , Jr.
ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

Ruden, R.J.
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

Sakai, Hideo
EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

Sarle, Charles R.
INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

Sayers, M.
INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

Schmidt, L.
DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

INITIAL EXPERIENCE WITH A DRIVER IMPROVEMENT PROGRAM FOR TRAFFIC OFFENDERS WITH ALCOHOL-RELATED PROBLEMS (ERSTE ERFAHRUNGEN MIT EINEM DRIVER-IMPROVEMENT-PROGRAMM FUR ALKOHOLAUFFALLIGE VERKEHRSSTRAFTATER)
HS-026 376

Schmidt, R.A.
MEASURING VISIBILITY IN BLOWING SNOW
HS-026 086

Schutzenhofer, A.
DRIVER IMPROVEMENT--IMPROVEMENT OF DRIVING BEHAVIOR OF PARTICULAR MOTOR VEHICLE DRIVERS. EXPERIENCE AND THEORETICAL CONSIDERATIONS (DRIVER IMPROVEMENT--VERBESSERUNG DES VERKEHRSVERHALTENS AUFFALLIGER KRAFTFAHRER. BISHERIGE ERFAHRUNGEN AND THEORETICSCHE GRUNDLAGEN)
HS-026 103

Schwarz, R.
ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 1: SUMMARY TECHNICAL REPORT. FINAL REPORT
HS-804 910

Schwarz, Robert
ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS
HS-026 295

Scoles, Pascal E.
CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

Segal, David J.
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT
HS-804 093

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT
HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT
HS-805 046

Segel, L.
INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT
HS-026 369

Shamsi, S. S.
ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE
HS-026 363

Shepard, Frank D.
TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT
HS-026 341

Shindo, Yoshio
A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION
HS-026 381

Siegel, Harold M.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Sivak, Michael
SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT
HS-804 095

Sklar, Sidney J.
"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL
HS-026 383

Somers, Joseph H.
HEAVY DUTY DIESEL PARTICULATE EMISSION FACTORS
HS-026 366

Spraker, Wilbur Allan , Jr.
THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

Staats, Elmer B.
THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

Steer, Robert A.
CLASSIFICATION OF MEN ARRESTED FOR DRIVING WHILE INTOXICATED, AND TREATMENT IMPLICATIONS. A CLUSTER-ANALYTIC STUDY
HS-026 340

Stein, Gunter
"SAFE-APPROACH" VEHICLE-FOLLOWER CONTROL
HS-026 383

Storr, P. C.
A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION
HS-026 301

Strother, C.
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

Struckman-Johnson, Cynthia
IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT
HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT
HS-803 997

Summers, Leland G.
SYSTEM ANALYSIS OF THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED
HS-026 087

Sutton, H. B.
THE POTENTIAL FOR ACTIVE SUSPENSION SYSTEMS
HS-026 331

Szykowski, j.p.
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

Takaski, G. M.
FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

Tamanini, F.J.
SMALL CAR SAFETY IN BIG-CAR COUNTRY
HS-026 287

Taylor, Dean L.
SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

Thompson, Steve
ENOUGH OF YAWNING EXAMINERS AND PARALLEL PARKING [DRIVER LICENSING TEST]
HS-026 319

Tombach, Ivar
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Tresselt, Carl P.
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

Tucker, Glenn J.
IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT
HS-804 018

Tyler, Rea
CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

Wade, Andrew J.
SHORT-TERM PHASE STABILITY OF AUDIO SIGNALS IN MOBILE RADIO VEHICLE-BASE LINKS
HS-026 316

Wagner, Edwin E.
SELECTED HAND TEST PERSONALITY VARIABLES RELATED TO ACCIDENTS IN FEMALE DRIVERS
HS-026 326

Walker, John
CHILDREN IN CRASHES: A SPECIAL ISSUE
HS-026 120

Wallace, Charles
SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

Wardle, John
ACCIDENT INVESTIGATION--WHO CHECKS THE SHOCK ABSORBERS
HS-026 109

Washburn, Pat
THE USED-OIL RECYCLING PROGRAM
HS-026 298

Wasser, C.F.
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

Watanabem, Junichi
MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Watson, N.
TURBOCHARGERS FOR THE 1980'S--CURRENT TRENDS AND FUTURE PROSPECTS
HS-026 358

Wattleworth, Joseph
SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT
HS-026 111

Weir, David H.
EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES
HS-026 289

Weltman, w.c.
PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS
HS-026 117

Wennell, Jenny
A MICROPROCESSOR-BASED SYSTEM FOR TRAFFIC DATA COLLECTION
HS-026 301

White, G.H.
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

White, Lawrence J.
AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

Wilkins, Mira
MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

Williams, Allan F.
MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

Yee, Henry C.
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

Yee, R.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

Zellner, John W.
EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES
HS-026 289

Zimmerman, R. M.
SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.
HS-804 026

Zino, Ken
COIL SPRING SERVICE
HS-026 371

Ziskind, R.
LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

Zuckerberg, Harry
DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT
HS-026 097

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Corporate Author Index

AeroVironment, Inc.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT HS-804 010

Alcoa Labs.
PERFORMANCE OF ALUMINUM AUTOMOTIVE RADIATORS HS-026 117

Anacapa Sciences, Inc., P.O. Drawer Q, Santa Barbara, Calif. 93102
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS HS-805 051

Anthony K. Mason, P.E., 6209 Avenida Cresta, LaJolla, Calif. 92037
ANALYZING THE FEASIBILITY OF THE ADMINISTATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 2. FINAL REPORT HS-803 974

Army Tank Automotive Res. and Devel. Command, Warren, Mich.
VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES HS-026 359

Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 1, HISTORY OF THE AUTOMOBILE TRANSMISSION IN THE UNITED STATES. INTERIM REPORT HS-803 855

Beiswenger, Hoch and Associates, P.O. Box 600028, North Miami Beach, Fla. 33160
SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT HS-026 111

Bendix corp.
A DIGITAL ELECTRONIC SHIFT SCHEDULE CONTROL FOR VEHICULAR AUTOMATIC TRANSMISSIONS HS-026 370

Bendix Corp., Bendix Res. Labs., Southfield, Mich. 48076
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION - PHASE 3 STUDY. FINAL TECHNICAL REPORT HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION. PHASE 3 STUDY. FINAL REPORT HS-805 050

C.N.R., Combustion Res. Lab., Naples, Italy
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL HS-026 357

California Inst. of Tech., Jet Propulsion Lab., Pasadena, Calif.
AUTOMOTIVE TECHNOLOGY PROJECTIONS HS-026 286

Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 1. FINAL REPORT HS-804 093

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 4. STAGED COLLISION RECONSTRUCTIONS. FINAL REPORT HS-805 040

Calspan Corp., 4455 Genesee St., Buffalo, N.Y. 14221
RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 1. DEVELOPMENT OF DATA BANK. FINAL REPORT HS-805 037

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. INTERIM REPORT HS-805 046

Chi Associates, Inc., Suite 316, 1011 Arlington Blvd., Arlington, Va. 22209
EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE. VOL. 3, NO. 1. FINAL REPORT HS-805 062

Chrysler Corp.
SELECTING THE OPTIMUM ENGINE CONNECTING ROD MANUFACTURING PROCESS HS-026 327

Citizens for Clean Air, Inc.
BEYOND AUTOCRACY: THE PUBLIC'S ROLE IN REGULATING THE AUTO HS-027 365

Cornell Univ., Ithaca, N.Y.
SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS HS-026 290

Creare Inc., Hanover, N.H.
TURBOCHARGER COMPRESSOR PERFORMANCE EVALUATION AND CRITICAL FLOW FIELD MEASUREMENTS HS-026 356

Cummins Engine Co.
HELMHOLTZ TUNED INDUCTION SYSTEM FOR TURBOCHARGED DIESEL ENGINE HS-026 364

TURBOCHARGING FOUR-CYCLE DIESEL ENGINES HS-026 355

Dana Corp., Spicer Front Drive Systems Div.
FRONT DRIVE SYSTEMS FOR FOUR-WHEEL DRIVE LIGHT TRUCKS HS-026 114

Departament of Transportation, Washington, D.C. 20590
THE SURFACE TRANSPORTATION. ASSISTANCE ACT OF 1978 HS-026 113

Department of Commerce
AUTOMOBILE FUEL ECONOMY STANDARDS FOR 1981-1985. A REVIEW AND RECOMMENDATIONS
HS-026 342

Department of Transport, Directorate of Statistics, 2 Marsham St., London SW1P 3EB, England
TRANSPORT STATISTICS GREAT BRITAIN 1967-1977
HS-026 082

Department of Transport, Office of Road Safety, Australia
THE EFFECTS OF RADIO AND PRESS PUBLICITY ON THE SAFE CARRIAGE OF CHILDREN IN CARS
HS-026 344

Dynamic Science, Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 5 REPORT OF TESTS 5.1, 5.2, AND 5.3. INTERIM REPORT
HS-803 990
DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 4 TEST REPORT. INTERIM REPORT
HS-803 991
DEVELOPMENT OF COMPLIANCE TEST FOR TRUCK REAR UNDERRIDE PROTECTION. TASK 3 TEST REPORT, INTERIM REPORT
HS-803 992
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILTY AND AGGRESSIVENESS. VOL. 1, SUMMARY REPORT. FINAL REPORT
HS-805 063

Economist Intelligence Unit, Ltd.
INTERNATIONAL COMPETITION IN THE WORLD AUTOMOTIVE INDUSTRY
HS-027 367

Economist Intelligence Unit, Ltd., Spenser House, 27 St. James Place, London, SW1A 1NT, England
THE UNITED KINGDOM AUTOMOBILE INSURANCE MARKET. FINAL REPORT
HS-804 151

Energy Absorption Systems, Inc.
SMALL CAR SAFETY IN BIG-CAR COUNTRY
HS-026 287

Environmental Health Associates, Inc.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Exxon Chemical Co.
BRIDGING THE GAP BETWEEN DEXTRON-II AND TYPE F ATF [AUTOMATIC TRANSMISSION FLUIDS]
HS-026 285

Federal Hwy. Administration, Washington, D.C. 20590
FHWA HIGHWAY TRAFFIC NOISE PREDICTION MODEL. FINAL REPORT
HS-026 375

Fiat Res. Centre, Turin, Italy
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

Florida International Univ., Dept. of Economics
MULTINATIONAL AUTOMOBILE ENTERPRISES AND REGULATION: AN HISTORICAL OVERVIEW
HS-027 369

Garrett Corp., AiResearch Industrial Div.
SERIES TURBOCHARGING--A REQUIREMENT FOR HIGH SPECIFIC OUTPUT, VEHICULAR DIESEL ENGINES
HS-026 362

General Accounting Office, Comptroller General of the United States Washington, D.C. 20548
THE CONGRESS NEEDS TO REDIRECT THE FEDERAL ELECTRIC VEHICLE PROGRAM. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 095

General Electric Co., Schenectady, N.Y.
SIMULATION OF OFF-ROAD MOTORCYCLE RIDE DYNAMICS
HS-026 290

Harvard Business School
STATUS OF THE AUTOMOTIVE SUPPLY INDUSTRY: A REVIEW OF INDUSTRY TRENDS FROM THE TRADE LITERATURE
HS-027 370
TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION
HS-027 366

Harvard Univ., Graduate School of Business Administration, Soldiers Field Rd., Boston, Mass. 02163
WORKSHOPS ON TECHNOLOGICAL CHANGE IN THE U.S. AUTOMOBILE INDUSTRY, OCTOBER 1977 THROUGH APRIL 1978, AND SYMPOSIUM ON TECHNOLOGY, GOVERNMENT AND THE AUTOMOTIVE FUTURE, OCTOBER 19-20, 1978, PROCEEDINGS. FINAL REPORT
HS-804 786

Imperial Coll. of Science and Technology, Dept. of Mechanical Engineering, London, England
TURBOCHARGERS FOR THE 1980'S--CURRENT TRENDS AND FUTURE PROSPECTS
HS-026 358

Insurance Inst. for Hwy. Safety, Watergate 600, Washington, D.C. 20037
MOTORCYCLE HELMET USE IN RELATION TO LEGAL REQUIREMENTS
HS-026 104

IVECO Engineering, Turin, Italy
EXHAUST EMISSIONS FROM A EUROPEAN LIGHT DUTY TURBOCHARGED DIESEL
HS-026 357

Japan Automobile Res. Inst. Inc., Japan
EXPERIMENTAL STUDY ON MOTORCYCLE STEERING PERFORMANCE
HS-026 293

Japan Automobile Res. Inst., Inc., Japan
EFFECT OF MAIN FACTORS ON DYNAMIC PROPERTIES OF MOTORCYCLE TIRES
HS-026 288

Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
STANDARDS ENFORCEMENT TEST REPORTS INDEX FOR 1978
HS-803 895

Kawasaki Heavy Industry, Japan
MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Lockheed California Co., Burbank, Calif.
CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

Lubrizol Corp., Res. Dept.
PERFORMANCE EVALUATION OF A VERSATILE TWO-CYCLE LUBRICANT ADDITIVE
HS-026 118

McKibben Engineering, Inc.
PRODUCT LIABILITY AND THE MOTORCYCLE DESIGNER
HS-026 292

Michigan Technological Univ.
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
RSV [RESEARCH SAFETY VEHICLE] PHASE 3. PROGRESS REPORT NO. 12, DECEMBER 1978-JANUARY 1979
HS-804 189

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 2: DRIVER AIR CUSHION RESTRAINT (ACRS) DEVELOPMENT FOR 1976 VEGA, VALIANT, AND CHEVETTE SUBCOMPACT VEHICLES. FINAL REPORT
HS-805 053

MBAssociates, P.O. Box 196, San Ramon, Calif. 94583
MOTORISTS' REQUIREMENTS FOR ACTIVE GRADE CROSSING WARNING DEVICES. FINAL REPORT
HS-026 343

National Hwy. Traffic Safety Administration, Emergency Medical Services Branch, 400 7th St., S.W., Washington, D.C. 20590
CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. STUDENT'S MANUAL. REV. ED.
HS-803 443

CRASH VICTIM EXTRICATION TRAINING COURSE. EMERGENCY MEDICAL TECHNICIAN. INSTRUCTOR'S MANUEL. REV. ED.
HS-803 444

National Hwy. Traffic Safety Administration, Office of Management Services, Room 4423, 400 7th St., S.W., Washington, D.C. 20590
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR 55 MPH NONCOMPLIANCE AND OTHER UNSAFE DRIVING ACTS, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH,DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 748

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR PEDESTRIAN/BICYCLIST/PUPIL TRANSPORTATION PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 749

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE PROGRAM MANAGEMENT, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 750

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR TRAFFIC LAW ADJUDICATION, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 751

National Hwy. Traffic Safety Administration, Office of Management Services, Room 4423, 400 7th St., S.W. Washington, D.C. 20590
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR POLICE TRAFFIC SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 752

National Hwy. Traffic Safety Administration, Office of Management Services, Room 4423, 400 7th St., S.W., Washington, D.C. 20590
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR DRIVER LICENSING PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 753

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR NATIONAL DRIVER REGISTER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 754

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTORCYCLE AND MOPED PROGRAM, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 755

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR YOUNG DRIVER, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 756

National Hwy. Traffic Safety Administration, Office of Management Services, Room 4423, 400 7th ST., S.W., Washington, D.C. 20590

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR EMERGENCY MEDICAL SERVICES, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 757

National Hwy. Traffic Safety Administration, Office of Management Services, Room 4423, 400 7th St., S.W., Washington, D.C. 20590

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR OCCUPANT RESTRAINT USAGE, FISCAL YEARS 1980 TO 1984, FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION UNDER SECTION 403 OF TITLE 23, USC
HS-804 758

National Hwy. Traffic Safety Administration, Washington, D.C. 20590

FINAL ASSESSMENT OF THE BUMPER STANDARD
HS-804 718

FINAL ASSESSMENT OF THE BUMPER STANDARD. EXECUTIVE SUMMARY
HS-804 719

CONSUMER SAFETY INFORMATION AS A GOVERNMENT POLICY TOOL
HS-805 136

REGULATION AND INNOVATION IN THE AUTOMOBILE INDUSTRY
HS-810 352

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590

PROPOSED PLAN FOR HIGHWAY SAFETY RESEARCH, DEVELOPMENT AND DEMONSTRATION (SECTION 403 OF TITLE 23, USC) FISCAL YEARS 1980-1984
HS-804 031

National Hwy. Traffic Safety Administration, 400 7th St., S.W. Washington, D.C. 20590

FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 186

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590

APPENDICES TO THE FIVE YEAR PLAN FOR MOTOR VEHICLE SAFETY AND FUEL ECONOMY RULEMAKING, CALENDAR YEARS 1980-1984
HS-804 759

National Roads and Motorists Assoc., Traffic and Safety Dept., 151 Clarence St., Sydney 2000, N.S.W., Australia

SURVEY OF CHILD RESTRAINTS IN AUSTRALIA. [N.R.M.A. REPORT NATIONAL ROADS AND MOTORISTS ASSOCIATION]
HS-026 385

National Roads and Motorists' Assoc., Traffic and Safety Dept., 151 Clarence St., Sydney 2000, N.S.W., Australia

THE USE OF RESTRAINTS BY CHILDREN IN AUTOMOBILES. N.R.M.A. [NATIONAL ROADS AND MOTORISTS' ASSOCIATION] SURVEY:
HS-026 386

National Telecommunications and Information Administration, Inst. for Telecommunication Sciences, Boulder, Colo. 80303

ESTIMATES OF MAXIMUM ELECTRIC FIELD STRENGTHS IN THE AUTOMOBILE ENVIRONMENT
HS-026 096

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594

HIGHWAY ACCIDENT REPORT. OVERTURN OF A YPSILANTI, MICHIGAN, BOYS CLUB BUS, I-75, NEAR TIFTON, GEORGIA, APRIL 11, 1978
HS-026 328

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594

HIGHWAY ACCIDENT REPORT. OSTERKAMP TRUCKING, INC., TRUCK/FULL TRAILER AND DODGE VAN COLLISION, U.S. 91, NEAR SCIPIO, UTAH, AUGUST 26, 1977
HS-026 329

National Transportation Safety Board, Bureau of Plans and Programs, Washington, D.C. 20594

SAFETY OF MULTIPURPOSE VANS. SPECIAL STUDY
HS-026 119

New Mexico State Univ., Physical Science lab., Box 3-PSL NMSU, Las Cruces, N. Mex. 88003

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 1: FINAL SUMMARY REPORT
HS-804 025

New Mexico State Univ., Physical Science Lab., Box 3-PSL NMSU, Las Cruces, N. Mex. 88003

SCHOOL BUS OCCUPANT RETROFIT PROTECTIVE MATERIALS. VOL. 2: FINAL TECHNICAL REPORT.
HS-804 026

New York Univ.

AUTOMOBILE EMISSIONS CONTROL POLICY--SUCCESS STORY OR WRONGHEADED REGULATION?
HS-027 368

Ohio State Univ., Transportation Control Lab., Columbus, Ohio 43210

FUNDAMENTAL STUDIES IN AUTOMATIC VEHICLE CONTROL. INTERIM REPORT
HS-026 367

Osaka Univ., dept. of Traffic psychology, Japan

MOTORCYCLISTS' VISUAL SCANNING PATTERN IN COMPARISON WITH AUTOMOBILE DRIVERS'
HS-026 291

Pakistan State Oil Co., Ltd., Karachi, Pakistan

ESTIMATING THE INFLUENCE OF PULSATING FLOW CONDITIONS ON THE PERFORMANCE OF A TURBINE
HS-026 363

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036

SUMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. DERIVATION AND USE OF AUTOMOBILE AVAILABILITY AS A VARIABLE FOR ESTIMATING TRAVEL DEMAND. FINAL REPORT
HS-026 347

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING ANNUAL RIDERSHIP AND OPER-

ATING EXPENSE FOR FIXED ROUTE BUS SYSTEMS IN SMALL URBAN AREAS. FINAL REPORT
HS-026 348

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR TRANSIT ROUTE EVALUATION. FINAL REPORT
HS-026 349

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. METHODOLOGY FOR ESTIMATING PARKING ACCUMULATION. FINAL REPORT
HS-026 350

SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ESTIMATING FRINGE PARKING SITE REQUIREMENTS. FINAL REPORT
HS-026 351

Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120
A LIMITED EVALUATION OF REFLECTIVE AND NON-REFLECTIVE BACKGROUND FOR OVERHEAD SIGNS. FINAL REPORT
HS-026 321

Pest, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
SIMPLIFIED AIDS FOR TRANSPORTATION ANALYSIS. ANNOTATED BIBLIOGRAPHY OF ANALYTICAL AIDS. FINAL REPORT
HS-026 346

Pioneer Engineering and Mfg. Co., 2500 E. Nine Mile Rd., Warren, Mich. 48091
ANALYSES OF SELECTED AUTOMOTIVE PARTS AND ASSEMBLIES FOR COST AND MATERIAL IMPACTS. FINAL REPORT
HS-803 842

Pioneer Engineering and Mfg. Co., 2500 East Nine Mile Rd., Warren, Mich. 48091
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL HIGH-VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK [FOR THE] (3500-4000 POUND) FULL SIZE CAR. FINAL REPORT
HS-803 894

Polytechnic Inst. of New York, Dept. of Transportation Planning and Engineering, 333Jay St., Brooklyn, N.Y. 11201
ANALYSIS OF PEDESTRIAN CROSSWALK SAFETY ON ONE-WAY STREET NETWORKS. FINAL REPORT
HS-026 320

Rocky Mountain Forest and Range Experiment Station
MEASURING VISIBILITY IN BLOWING SNOW
HS-026 086

Science Applications, Inc., Energy and Environmental Sciences Div., 1651 Old Meadow Rd., Room 620, McLean, Va. 22101
ENGINEERING GUIDELINES FOR THE ANALYSIS OF TRAFFIC-INDUCED VIBRATION. FINAL REPORT
HS-026 112

Science Applications, Inc., 1801 Ave. of the Stars, Suite 1205, Los Angeles, Calif. 90067
LONG LIFE HYDRAULIC BRAKE SYSTEM. SUMMARY REPORT. FINAL REPORT
HS-805 068

Society of Automotive Engineeers, 400 Commonwealth Drive, Warrendale, Pa. 15096
LIGHTING EQUIPMENT AND PHOTOMETRIC TESTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 339

Society of Automotive Engineers, Inc., 400 Commonwelath Drive, Warrendale, Pa. 15096
IRON AND STEEL. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 334

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
FLUID CONDUCTORS AND CONNECTORS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORT. HANDBOOK SUPPLEMENT. 1979 ED.
HS-026 333

TURBOCHARGERS AND TURBOCHARGED ENGINES
HS-026 352

South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT
HS-804 010

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 1: SUMMARY TECHNICAL REPORT. FINAL REPORT
HS-804 910

South Coast Technology, Inc., Santa Barbara, Calif.
ACCIDENT AVOIDANCE CHARACTERISTICS OF UNCONVENTIONAL MOTORCYCLE CONFIGURATIONS
HS-026 295

Systems Technology, Inc., Hawthorne, Calif.
EXPERIMENTAL INVESTIGATION OF THE TRANSIENT BEHAVIOR OF MOTORCYCLES
HS-026 294

MOPED DIRECTIONAL DYNAMICS AND HANDLING QUALITIES
HS-026 289

Systems Technology, Inc., 13766 South Hawthorne, Blvd., Hawthorne, Calif. 90250
DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 078

Teledyne Continental Motors, General Products Div., Muskegon, Mich.
VARIABLE AREA TURBOCHARGER FOR HIGH OUTPUT DIESEL ENGINES
HS-026 359

Thermo Mechanical Systems Co., Canoga Park, Calif.
CENTRIFUGAL COMPRESSOR DEVELOPMENT FOR A VARIABLE AREA TURBOCHARGER
HS-026 361

Toyota Motor Co., Ltd., Japan

A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION

HS-026 381

Transportation Assoc. of America, 1100 17th St., N.W., Suite 1107, Washington D.C. 20036

TRANSPORTATION FACTS AND TRENDS. A STATISTICAL ANALYSIS SHOWING THE IMPORTANCE OF TRANSPORTATION TO THE UNITED STATES, AS WELL AS TRANSPORTATION TRENDS--INCLUDING BOTH FOR-HIRE AND PRIVATE CARRIAGE. 14TH ED.

HS-026 322

Transportation Systems Center, Cambridge, Mass 02142

MANDATED FUEL ECONOMY STANDARDS AS A STRATEGY FOR IMPROVING MOTOR VEHICLE FUEL ECONOMY

HS-027 364

Transportation Systems Center, Cambridge, Mass. 02142

DIESEL BUS PERFORMANCE SIMULATION PROGRAM. FINAL REPORT

HS-026 097

Transportation Systems Center, Technology Sharing Prog. Office, Kendall Square, Cambridge, Mass. 02142

TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS

HS-026 345

University of California, Statewide Air Pollution Res. Center

AN INITIAL ASSESSMENT OF THE LITERATURE ON THE MEASUREMENT, CONTROL TRANSPORT, TRANSFORMATION AND HEALTH EFFECTS OF UNREGULATED DIESEL ENGINE EMISIONS. FINAL REPORT

HS-804 010

University of Florida, Transportation Res. Center

SAFETY EVALUATION OF PRIORITY TECHNIQUES FOR HIGH-OCCUPANCY VEHICLES. FINAL REPORT

HS-026 111

University of Kansas Coll. of Health Sciences, Emergency Medical Training Prog., 39th at Rainbow Blvd., Kansas City, Kans. 66103

IMPACT OF THE REPEAL OF THE KANSAS MANDATORY MOTORCYCLE HELMET LAW. FINAL REPORT

HS-804 018

University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109

TINTED WINDSHIELD INVOLVEMENT AMONG CPIR [COLLISION PERFORMANCE AND INJURY REPORT] ACCIDENTS. FINAL REPORT

HS-026 085

STOCHASTIC ANALYSIS OF FUTURE VEHICLE POPULATIONS. FINAL REPORT

HS-803 656

SIGNAL LIGHTING SYSTEM REQUIREMENTS FOR EMERGENCY, SCHOOL BUS AND SERVICE VEHICLES. FINAL REPORT

HS-804 095

University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109

INVESTIGATION OF THE INFLUENCE OF VARIOUS BRAKING REGULATIONS ON ACCIDENT AVOIDANCE PERFORMANCE. FINAL TECHNICAL REPORT

HS-026 369

University of Missouri-Rolla, Rolla, Mo.

DPMAS [DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM] UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL SUMMARY REPORT.

HS-804 722

University of Pennsylvania

TOWARD MORE EFFECTIVE ORGANIZATION FOR PUBLIC REGULATION

HS-027 366

University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA: EXECUTIVE SUMMARY. FINAL REPORT.

HS-803 960

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. VOL. 1. FINAL REPORT

HS-803 996

IMPACTS OF MOTORCYCLE HELMET LAW REPEAL IN SOUTH DAKOTA. APPENDICES. FINAL REPORT

HS-803 997

University of Tokyo, Japan

A FUNDAMENTAL CONSIDERATION ON SHIFT MECHANISM OF AUTOMATIC TRANSMISSION

HS-026 381

Utah Dept. of Transportation, Travel Analysis Unit, First Security Bldg., Room 800, 405 S. Main St., Salt Lake City, Utah 84111

TRAFFIC ON UTAH HIGHWAYS 1978

HS-026 313

Utah Hwy. Safety Office, 455 E. 4th South, Suite 314, Salt Lake City, Utah 84111

JUVENILE COURT ALCOHOL SCHOOL EVALUATION. INTERIM REPORT, SEPTEMBER 29, 1976 TO JUNE 1, 1977

HS-803 891

Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.

TRAFFIC FLOW EVALUATION OF PAVEMENT INSET LIGHTS FOR USE DURING FOG. FINAL REPORT

HS-026 341

ATTITUDES OF VIRGINIANS TOWARD TRANSPORTATION SAFETY. RESULTS OF THE 1978 TRANSPORTATION SAFETY PUBLIC OPINION POLL. FINAL REPORT

HS-026 384

Volkswagenwerk A.G., Wolfsburg, Germany

TURBOCHARGING SMALL DISPLACEMENT SPARK IGNITION ENGINES FOR IMPROVED FUEL ECONOMY

HS-026 353

Vought Corp., Dallas, Tex.
FABRICATION OF AUTOMOTIVE BODY COMPONENTS IN GRFRP [GRAPHITE FIBER REINFORCED PLASTIC]
HS-026 315

Wallace Murray Corp., Schwitzer Div., Indianapolis, Ind.
INSTALLATION AND DESIGN PROBLEMS ASSOCIATED WITH THE AUTOMOTIVE TURBOCHARGER
HS-026 354

THE EFFECT OF COMPRESSOR AND TURBINE SPECIFIC SPEED ON TURBOCHARGER EFFICIENCY AND ENGINE PERFORMANCE
HS-026 360

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Contract Number Index

DOT-FH-11-8494
Science Applications, Inc., Energy and Environmental Sciences Div., 1651 Old Meadow Rd., Room 620, McLean, Va. 22101
HS-026 112

DOT-FH-11-8846
MBAssociates, P.O. Box 196, San Ramon, Calif. 94583
HS-026 343

DOT-FH-11-9182
Beiswenger, Hoch and Associates, P.O. Box 600028, North Miami Beach, Fla. 33160; University of Florida, Transportation Res. Center
HS-026 111

DOT-FH-11-9257
Ohio State Univ., Transportation Control Lab., Columbus, Ohio 43210
HS-026 367

DOT-HS-6-01381
Systems Technology, Inc., Hawthorne, Calif.
HS-026 294

DOT-HS-6-01382
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
HS-804 093

DOT-HS-6-01412
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
HS-805 053

DOT-HS-6-01423
University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069
HS-803 960

University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069
HS-803 996

University of South Dakota, Human Factors Lab., Vermillion, S. Dak. 57069
HS-803 997

DOT-HS-6-01450
Bendix Corp., Bendix Res. Labs., Southfield, Mich. 48076
HS-805 049

Bendix Corp., Bendix Res. Labs., Southfield, Mich. 48076
HS-805 050

DOT-HS-6-01468
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New Mexico State Univ., Physical Science lab., Box 3-PSL NMSU, Las Cruces, N. Mex. 88003
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New Mexico State Univ., Physical Science Lab., Box 3-PSL NMSU, Las Cruces, N. Mex. 88003
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Pioneer Engineering and Mfg. Co., 2500 E. Nine Mile Rd., Warren, Mich. 48091
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HS-026 348

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
HS-026 349

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
HS-026 350

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
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Report Number Index

BPR-2100-01-79	HS-804 189
DOT-HS-6-01487-(*I-1)	HS-803 891
DOT-TSC-NHTSA-79-11.*I	HS-803 855
DOT-TSC-NHTSA-79-19	HS-803 842
DOT-TSC-NHTSA-79-20	HS-803 656
DOT-TSC-NHTSA-79-23	HS-804 151
DOT-TSC-NHTSA-79-33	HS-804 786
DOT-TSC-UMTA-79-16	HS-026 097
DOT/RSPA/DPB-50/78/28	HS-026 320
EMD-79-6	HS-026 095
FHWA-PA-78-19	HS-026 321
FHWA-RD-77-108	HS-026 375
FHWA-RD-77-167	HS-026 343
FHWA-RD-78-166	HS-026 112
FHWA-RD-79-42	HS-026 367
FHWA-RD-79-59	HS-026 111
HFL-78-7	HS-803 996
HFL-78-7-*APP.	HS-803 997
HFL-78-8	HS-803 960
MB-*R-77/72	HS-026 343
NTIA-79-16	HS-026 096
NTSB-HAR-79-1	HS-026 329
NTSB-HAR-79-2	HS-026 328
NTSB-HSS-79-1	HS-026 119

PB-291 328	HS-026 320
PB-291 577	HS-026 321
PB-291 748	HS-026 369
SAE- 790311	HS-026 353
SAE-HS-150	HS-026 333
SAE-HS-30	HS-026 334
SAE-HS-34	HS-026 339
SAE-SP-435	HS-026 116
SAE-SP-437	HS-026 114
SAE-SP-442	HS-026 352
SAE-790019	HS-026 285
SAE-790021	HS-026 286
SAE-790023	HS-026 327
SAE-790028	HS-026 315
SAE-790043	HS-026 381
SAE-790044	HS-026 370
SAE-790063	HS-026 358
SAE-790064	HS-026 359
SAE-790065	HS-026 360
SAE-790066	HS-026 361
SAE-790067	HS-026 362
SAE-790068	HS-026 363
SAE-790069	HS-026 364
SAE-790075	HS-026 344

SAE-790080	HS-026 118
SAE-790258	HS-026 295
SAE-790259	HS-026 288
SAE-790260	HS-026 289
SAE-790261	HS-026 290
SAE-790262	HS-026 291
SAE-790264	HS-026 292
SAE-790265	HS-026 293
SAE-790266	HS-026 294
SAE-790294	HS-026 287
SAE-790313	HS-026 354
SAE-790314	HS-026 355
SAE-790315	HS-026 356
SAE-790316	HS-026 357
SAE-790400	HS-026 117
SAI-068-80-516	HS-805 068
STI-TR-1117-1-*I	HS-805 078
UM-HSRI-78-15	HS-803 656
UM-HSRI-78-51	HS-026 369
UM-HSRI-78-55	HS-804 095
UM-HSRI-79-16	HS-026 085
UMTA-IT-06-9020-70-6	HS-026 351
UMTA-IT-06-9020-79-1	HS-026 346
UMTA-IT-06-9020-79-2	HS-026 347
UMTA-IT-06-9020-79-3	HS-026 348
UMTA-IT-06-9020-79-4	HS-026 349
UMTA-MA-06-0044-79-1	HS-026 097
UTMA-IT-06-9020-79-5	HS-026 350
VHTRC-78-*R25	HS-026 341
VHTRC-79-*R51	HS-026 384
ZQ-5993-*V-1	HS-804 093
ZQ-6057-*V-1	HS-805 046
ZQ-6057-*V-3	HS-805 037
ZQ-6057-*V-6	HS-805 040
321-1	HS-805 051
5-451-00-288-00	HS-026 112
784712-1	HS-026 367
8316-78-171A	HS-805 063
8319-78-139A	HS-803 992
8319-78-149A	HS-803 991
8319-78-193A	HS-803 990
8904	HS-805 049
8940	HS-805 050

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U.S. Department of Transportation **National Highway Traffic Safety Administration**

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SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Corporate author: Inquiries should be addressed to the organization listed in the individual citation.

ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-026 389

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE

A review is presented of car transmission types and transmission requirements (especially for fuel savings), as well as a discussion of the potential advantages of continuously variable transmissions (CVT's) to provide low engine rpm with high vehicle speed. The control of the engine-clutch-CVT system to provide optimum performance is explained. Results of computer simulation and/or bench or road tests are provided for three transmissions: Renault hydrostatic prototype, 2-mode hydromechanical, and a Van Doorne prototype Transmatic. These tests, conducted as part of three current Renault projects, have demonstrated advantages for CVT's with high ratio coverage and high overdrive ratios; for cars equipped with spark ignition (SI) engines the advantages include smoother ride, improved fuel economy, and less noise, due to increased load levels but lower rpm. Highway fuel economy trends are quantified for diesel and/or turbocharged engines. Emission tests are in progress.

by P. Baudoin
Regie Nationale des Usines Renault, France
Rept. No. SAE-790041 ; 1979 ; 15p
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored mainly by Institut de Recherche des Transports (France).
Availability: SAE

HS-026 390

PURELY HYDROSTATIC HIGH RATIO TRANSMISSION

A prototype, purely hydrostatic, continuously variable transmission has been developed for passenger car applications, featuring high-power-to-weight-ratio hydraulic pump and motors to avoid bulk and weight penalties. Materials and manufacturing processes are no more sophisticated than for conventional automobiles. The transmission is capable of transferring 45 hp through an overall ratio of four, increased by 50% toward longer ratios at constant speed output and with shorter ratios at constant torque for start-up. The transmission could transfer up to 90 hp in a smaller range of ratios. Transmission geometry is suitable for installation in the present Renault 12 chassis (a front-wheel drive car with an engine delivering 45 hp at 5200 rpm, whose torque curve at maximum injection passes through a maximum of 9.2 mdaN at about 3500 rpm and through 6.3 mdaN at maximum speed). The calculated energy efficiency remains between 80% and 85% within a sufficiently wide operating range, even in the long ratios, but the actual efficiency seems to be 5% less in the useful operating range. Remaining work includes evaluating the actual efficiency in bench tests throughout the range, durability in vehicle use, noise, thermal balance in a vehicle, and retention of performance over time.

by R. Maistrelli
Regie Nationale des Usines Renault, France
Rept. No. SAE-790042 ; 1979 ; 22p
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored mainly by Institut de Recherche des Transports (France).
Availability: SAE

HS-026 391

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE

The procedures used to fabricate and assemble a lightweight demonstration passenger car using graphite fiber reinforced plastic (G.F.R.P.) are described. The requirements of the unique vehicle made it necessary to combine state-of-the-art aerospace manufacturing methods (Vought Corp.) with current automotive prototype technology (Milford Fabricating Co.). The medium and small G.F.R.P. component groups consisting of fenders, bumpers, doors, decklid, package tray, wheels, dash, and cowl were produced for subassembly, body assembly, and final vehicle completion at the Milford Fabricating Co. Adhesives for assembly were tested and recommended by the Budd Co. Plastic Res. and Devel. Center (Hysol epoxy, Goodyear urethane). Ford Motor Co. supplied a 1979 prototype sheet metal body, prepreg graphite materials, the necessary engineering drawings, tooling aids normally supplied for the manufacture of sheet metal detail prototype parts, and one of the early production 1979 Ford LTD's, which was used as a source of parts. Major areas of the program are discussed in detail: master tooling aid development, high-temperature epoxy molds, component fabrication, component group subassembly, and assembly of body, chassis, and final vehicle.

by Dennis A. Cedar
Milford Fabricating Co., Detroit, Mich.
Rept. No. SAE-790029 ; 1979 ; 16p
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Sponsored by Ford Motor Co.
Availability: SAE

HS-026 392

MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS

Data were analyzed for all police-reported motorcycle (473) and minibike (14) accidents that occurred in three contiguous counties in upstate New York (Monroe (Rochester), Wayne, and Ontario) from 1 Apr to 31 Dec 1976, as part of a program to improve safety and injury protection of riders of motorcycles, minibikes, and mopeds. About three-fourths of all riders were known to be injured; some data show that the injury rate was closer to 90%. The overall AIS (Abbreviated Injury Scale) for all riders was 1.34, which is about twice that sustained by occupants of closed vehicles in which a towaway criterion was used to sample overall accidents. Passengers fared somewhat better than operators (1.22 vs. 1.37). The average severity of an individual injury was 1.6. The most vulnerable body regions were the head, chest, and abdomen, with average severity of injuries of 2.8, 2.57, and 2.85, respectively; these accounted for 14.3% of all injuries. Overall, upper- and lower-extremity injuries accounted for 60% of all injuries. Head injuries accounted for only 5.5% of the injuries, the low figure attributed to helmet use. Skin injuries were the most frequent, while skeletal injuries comprised a substantial percentage (22.3%). Of 17 cyclists who were in critical and maximum severity accidents, 7 would have sustained severe head injuries regardless of helmet use, while in four out of six cases helmets attenuated head injuries (helmet failed in one case, was not a factor in the other); there were also two cases in which a helmet would have attenuated injury and two cases with no head contact. The highest AIS occurred in head-on collisions between motorcycles and other vehicles (AIS of about 2.5, accounting for 3.1% of all injuries). The overall average severity of injuries in motorcycle-only accidents was 1.42. The severity of injuries sustained by minibike operators and passengers was comparable to that of motorcycle riders.

by John C. Balcerak; Kathleen L. Pancione; John D. States
Publ: New York State Journal of Medicine v78 n4 p628-33 (Mar 1978)
1978 ; 5refs
Presented at 171st Annual Meeting of Medical Society of the State of New York, New York City, 2 Oct 1977. Research sponsored by State of New York Dept. of Motor Vehicles.
Availability: See publication

HS-026 393

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT

A project was initiated in Dec 1977 on a segment of I-35W between I-494 and 66th St. in Richfield, Minnesota as part of the Minnesota Dept. of Transportation's I-35W traffic management system, in order to obtain installation, operations, maintenance, and evaluation data on highway advisory radio (HAR) in a surveillance and control network. The installation and operations of HAR for a one-year period are described and assessed, including analyses of major system elements, message characteristics, motorist use and acceptance, and various system costs. It is concluded that the HAR system is an effective element of the I-35W traffic management program. Motorist awareness and use of the system were satisfactory. Traffic diversion studies indicated that commuters divert from the freeway in response to an HAR broadcast when congestion is heavy, when they are given sufficient detailed information, and when they have adequate alternate routes. Motorist acceptance of the system was very high. System limitations included the fact that 20% of the commuters never tuned to HAR broadcasts, another 17% had serious tuning difficulties, 3% were not aware of the system, and 3% had no AM radio in their car. These limitations could largely be overcome by expanding the system, upgrading the broadcast quality, and providing more detailed traffic information. System implementation and operation did not place a great demand on financial and staff resources.

by G. C. Carlson; R. D. Dahl; A. Z. Lari
Minnesota Dept. of Transportation, Traffic Management Center, 1101 4th Ave. S., Minneapolis, Minn. 55404
DOT-FH-11-8565
Rept. No. FHWA-RD-79-33 ; 1979 ; 89p 11refs
Availability: NTIS

HS-026 394

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS

Various statistics and studies are cited to show the extent of the fatal motorcycle accident problem and the vulnerability of the unprotected head of the motorcyclist who does not wear a helmet. Responses are enumerated from a 1977 American Medical Association (AMA) conference to common motorcyclist allegations. The AMA opinions indicate that helmets per se do not contribute to or worsen cervical-spine injuries; that helmets provide only minor restrictions in peripheral vision; that hearing reduction associated with helmet use is inconsequential in a driving situation; and that no evidence supports helmet weight as a cause of accidents and increased rider fatigue. The unsuccessful challenge to the constitutionality of motorcycle helmet use laws in the courts is mentioned, and results of various studies are cited which show the decline in motorcycle accident fatalities after implementation of mandatory helmet use laws, and an increase after repeal. Considerable support is claimed for mandatory helmet laws (one study reporting 55% and 92% acceptance of such laws by motorcyclists and the general public, respectively). The Massachusetts Dept. of Public Health strongly supports the following recommendations of the AMA's Conference on Head Protection for the Cyclist: that everyone who drives or rides a motorcycle wear a properly fitted, approved helmet; that full-facial-coverage be provided; and that the medical and public health community actively involve itself in promoting the use of safety helmets. The Department also supports medical community cooperation with the Dept. of Transportation's efforts to persuade the motorcycle industry to emphasize the utilitarian aspects of moderate-performance vehicles rather than to push sales of overpowered machines.

by Pearl K. Russo
Publ: New England Journal of Medicine v299 n19 p1074-6 (9 Nov 1978)
1978 ; 24refs
Availability: See publication

HS-026 395

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING

Downsizing and weight reduction, the switch to metrication, the trend toward more corrosion-resistant materials and coatings, and concerns over defects and liability litigation are creating changes in fasteners (screws, nuts, bolts) and other joining systems, such as welds and adhesives. As cars get smaller and lighter so do the fasteners that hold subassemblies together. To reduce causes of corrosion, many holes in car bodies formerly used for fasteners are being eliminated. Metal clips are being replaced by plastic in external trim applications. Growing plastic usage in body components is requiring new designs to accommodate the material changes. Increasing use of aluminum in body panels is expanding use of hemming and stitching techniques to replace resistance spot welding in order to cut costs and energy use and to boost productivity. High strength steel is creating some fastening problems. New finishes are being applied to metal fasteners to help reduce corrosion, and adhesives are being used for such areas as lightweight trim moldings. To reduce product liability risks, automakers are using more fasteners with self-locking thread forms, or chemical thread coatings and other locking devices. Wholesale product revamping and the consolidation of more body stampings are resulting in fewer welds. In some structural and hang-on part applications, welding is replacing mechanical fastening to reduce weight, complexity and assembly time. Lighter-weight component design is increasing electron beam and friction welding prospects, and corrosion-resistant material use in body components is modifying welding techniques. Meanwhile, U.S. fastener manufacturers face the problem of the growing influx of imported ferrous fasteners, mainly from Japan. A list of fastener supplies is provided in a separate section.

by Al Wrigley
Publ: Ward's Auto World v15 n6 p49-51 (Jun 1979)
1979
Availability: See publication

HS-026 396

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979

A transcript is provided for a televised interview of Brock Adams, Dept. of Transportation (DOT) Secretary, and Elliot Estes, General Motors (GM) President, by Robert MacNeil and Jim Lehrer of the Educational Broadcasting Co. Under discussion is DOT's challenge to the auto industry to reinvent the automobile in order to meet future energy demands. Mr. Adams emphasizes the need for basic research and evolutionary approaches to develop a new car by 1990 to meet fuel economy needs which he believes will surpass the mandated 27.5 mpg for 1985. Mr. Adams feels that 50 mpg fuel economy is a realistic expectation for the year 2000. Mr. Estes does not dispute the need to improve cars and fuel economy but questions the meaning of "reinventing the car". He sees 50 mpg as a realistic goal but sees possible problems in the price range and consumer acceptability of a new design to meet this figure. Mr. Estes emphasizes GM's redesign of 90% of its cars in three years and the resulting 5 mpg improvement in fuel economy. Mr. Adams and Mr. Estes are in agreement on the need for basic research on thermodynamics, combustion, fluid dynamics, and structures.

Educational Broadcasting Corp., MacNeil/Lehrer Report,
WNET/13, New York, N.Y. and WETA/26, Washington, D.C.
1979 ; 15p
Availability: MacNeil/Lehrer Report, P.O. Box 345, New York,
N.Y. 10019 $1.00

HS-026 397

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979

The transcript is provided for a televised interview of Joan Claybrook, Administrator of the National Hwy. Traffic Safety Administration (NHTSA); Donald Randall, an attorney for the Automotive Service Council; Robert McMen, Deputy Director of the New Jersey Dept. of Motor Vehicles; and Tom Hanna, senior vice president and chief operating officer of the Motor Vehicle Manufacturers Assoc., by Robert MacNeil and Jim Lehrer of the Educational Broadcasting Co., on the subject of fraud in the auto repair industry. The interview stemmed from a recent release of results of a Dept. of Transportation (DOT) undercover survey of repair shops in seven cities showing that $.53 of each dollar spent was wasted. A three-day meeting sponsored by DOT brought together industry, consumer, and government representatives to investigate the repair industry problem. Those interviewed were leading participants in the meeting. Ms. Claybrook agrees that the consumer often has a 50/50 chance of being cheated for repair work, and that it is difficult to bring a criminal charge against a dishonest mechanic. The NHTSA Administrator supports diagnostic centers separate from repair shops, but considers them probably economically infeasible on a national level. She supports better repair provisions built into cars. Mr. Randall states that fraud constitutes the smallest part of the problem, which involves training and confidence of service technicians and increasing complexity of the car. Mr. McMen presently feels that the State of New Jersey should not be involved in automotive diagnosis, but is in favor of mechanic training and possible state licensing. Mr. Hanna acknowledges that the auto industry is offering extended warranties to allay consumer anxiety about repairs; he cites efforts by the industry to promote mechanic training and certification, and opposes diagnostic centers, and standardized diagnostic provisions in cars. Ms. Claybrook, additionally, advises consumers to read car repair information material, to learn to do minor repairs, and to familiarize themselves with state laws.

Educational Broadcasting Corp., MacNeil/Lehrer Report,
WNET/13, New York, N.Y. and WETA/26, Washington, D.C.
1979 ; 15p
Availability: MacNeil/Lehrer Report, P.O. Box 345, New York,
N.Y. 10019 $1.00

HS-026 398

A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM

A strategy is outlined for finding and realizing the best compromise between fuel injection parameters and diesel engine engineering targets. The application of the strategy is demonstrated using actual results of a study based on optimization of exhaust emissions and fuel economy for a diesel passenger car. The strategy for the optimum adaptation of a fuel injection system to a diesel engine includes reduction of the fuel injection system parameters to be optimized in the test, selection of the optimization points, and determination of the optimum adaptation at which all target requirements are met. The optimum design of a fuel injection system can be practically determined by the systematic variation of two injection parameters: start and duration of injection. This applies without qualification to indirect injection and by meeting certain nozzle design and injection pressure boundary conditions for direct injection. Since the optimization points are not expressly specified by the engine manufacturer or by legislation, their selection is best based on the frequency distribution of load and speed in the particular test procedure. It is possible to determine representative operating points which also take transient operation into account. The optimum design is presented and analyzed in the form of an overlap area from isograms in which the target requirements are boundary lines for the start and duration of injection.

by W. G. Wessel; E.-U. Joachim
Robert Bosch G.m.b.H., Germany
Rept. No. SAE-790036 ; 1979 ; 18p 3refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 399

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS

The same distribution of injury severities (fatal, serious, slight, and uninjured) sustained by the two drivers involved in head-on collisions between two vehicles of equal mass is considered using latent structure models for analysis of contingency table data. Rural accident data for Great Britain for the period 1969-1972 are examined. The positive correlation between the injury severities of the two drivers is explained by the speed of the automobiles involved in the accident, a variable which is not recorded in national accident statistics and is thus "latent".

by T. P. Hutchinson
Publ: Statistica Neerlandica v31 p105-11 (1977)
1977 ; 8refs
Sponsored by Transport and Road Res. Lab. (England).
Availability: See publication

HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT

Recent data for the State of Ohio indicate that the National Ambient Air Quality Standards for carbon monoxide and photochemical oxidants will not be attained in all areas of the state by 1982, even if all reasonably available control technologies are applied. In view of this, it is likely that the state will request from the Environmental Protection Agency an extension of the compliance date beyond 1982. In order for this request to be considered, the state, among other things, must have adopted a firm schedule for implementing a motor vehicle inspection and maintenance (I/M) program in the highly urbanized nonattainment areas. The State of Ohio is currently planning for the implementation of such a program. Detailed analyses performed as part of this effort are presented which cover the costs, benefits, personnel requirements, direct and indirect impacts, and scheduling requirements associated with the particular program option being considered.

by David B. Ramsay; Lee A. Coda; Nancy K. Roy; Robert O. Phillips; Frederick M. Sellars; Thomas P. Snyder; Donna L. Vlasak
GCA Corp., GCA/Technology Div., Burlington Rd., Bedford, Mass. 01730
EPA-68-02-2887
Rept. No. EPA-905/2-78-007; PB-290 323; GCA-TR-78-59-G ; 1978 ; 245p refs
Availability: NTIS

HS-026 401

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT

An enhanced version of the original system for management evaluation of trailer/motorcycle, rejection, and auto/truck approval receipts issued under the Virginia periodic motor vehicle inspection (PMVI) program is described. The procedures are described which were developed for calculating the appropriate sample sizes and for providing a method of sampling which may be used to determine a statewide failure rate for each item inspected and for vehicles of different type, age, and mileage categories. A procedure is also outlined and software provided to implement an evaluation of stations suspected of improper inspection practices. This method compares failure rates for individual stations to the statewide norms. A coding and keying manual for processing information from inspection receipts is appended. This new management system provides for evaluation of the Virginia PMVI program at a lower cost and with greater accuracy than was previously possible. Among the recommendations are implementation of a method for positively identifying the mechanic performing an inspection, an improved method for determining true vehicle mileage, use of a different configuration for trailer/motorcycle rejection receipts, and modification of the present filing system.

by Jerry L. Korf; Deborah A. Mitchell; Philip S. Harris
Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Rept. No. VHTRC-79-R47 ; 1979 ; 64p 4refs
Sponsored by Virginia Dept. of Transportation Safety.
Availability: Corporate author

HS-026 402

DYNAMICS OF WHEELED RECREATIONAL VEHICLES

This compilation of eight papers presents recent research results on the kinematics, dynamics, stability and control of wheeled recreational vehicles (RV's), including camper trailers, vans, boat trailers, bicycles, motorcycles, dune buggies, and snowmobiles. Emphasis is on the modeling of the underlying physical phenomena governing the dynamic behavior of wheeled RV's. The effect of wheel-roadway interaction phenomena in the development of realistic dynamic models of trailers and two-wheeled vehicles is discussed in considerable detail, with a separate example of its effect on the behavior of a steady-turning vehicle-trailer system. The effect of lateral hitchpoint stiffness is studied, and some very useful analytical and experimental methods for determing trailer stability are presented. The effect of numerous parameters affecting trailer stability is examined in detail; the effects of roll steer and drawbar flexibility are addressed, as well as control and safe operation of RV trailers. The off-road stability of RV's is studied; novel approaches from ship stability theory and catastrophe theory are introduced which prove to be useful and effective for stability analysis with very rough terrain.

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-443 ; 1979 ; 81p refs
Includes HS-026 403--HS-026 410. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 403

CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES

Seven mathematical models for the interaction of a pneumatic tire with a roadway are analyzed using a single-wheel trailer and assuming that the tire and roadway touch each other at only one point. The following cases are modeled: rolling without slip alternating with sliding, rolling without slip alternating with side slipping, side slip with side force proportional to slip angle, slipping with horizontal contact force proportional to slip angle, and tire with one, two, or three degrees of freedom (accounting for tire elasticity by introducing a rigid tire that is elastically connected to a hub). Results of numerical solutions are given in graphical form for the first four models. Significant disparities are found among the predictions of the various theories. This work is intended to form the basis for experiments to determine which model, if any, is, in fact, valid.

by Thomas R. Kane; Guy K. Man
Stanford Univ., Dept. of Mechanical Engineering, Stanford, Calif.
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p1-13
Rept. No. SAE-790181 ; 1979 ; 21refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979
Availability: In HS-026 402

HS-026 404

EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY

The effect on trailer stability of hitchpoint lateral stiffness and damping is examined using a model which is a one degree of freedom, nonholonomic, dynamical system and yields a third order linear differential equation. Trailer stability criteria are developed, and stability charts are presented which depict the stability criteria in terms of nondimensional parameters. The analyses show that increasing hitchpoint lateral stiffness does not improve trailer stability, whereas increasing hitchpoint lateral damping is much more important to trailer stability. It is further shown that the percentage of trailer weight carried by the hitchpoint (i.e. hitchpoint loading) is very important to trailer stability; generally, the greater the value of hitch loading the smaller the trailer's unstable region. Other important factors in trailer stability are the trailer's mass, mass distribution, and geometric construction. Generally, when the difference is reduced between a positive, nondimensional parameter characterizing these three trailer aspects and a parameter representing the fraction of trailer carried by the hitch and characterizing the trailer loading condition, the trailer's stability is improved and hitchpoint lateral damping requirement reduced.

by T. R. Robe
University of Kentucky, Lexington, Ky.
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p15-20
Rept. No. SAE-790182 ; 1979 ; 7refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 402

HS-026 405

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES

In order to determine the effects of roll steer and drawbar flexibility on the stability of articulated recreational vehicles, and whether these effects are independent, comparisons are made of the stability predictions from four different articulated vehicle models (one with rigid drawbar and no roll freedom, one with flexible drawbar and no roll freedom, one with rigid drawbar and roll freedom, and one with flexible drawbar and roll freedom). The models are compared in terms of a critical forward speed above which constant speed motion in a straight line is unstable. It is found that roll freedom (through roll steer) does affect stability. Negative front and positive rear roll steer are stabilizing; positive front roll steer and negative rear roll steer are destabilizing. Over a large range of values, drawbar stiffness and damping do not affect stability if roll steer is not present. Drawbar flexibility can significantly affect stability when roll steer is present. A decrease in drawbar stiffness can be either stabilizing or destabilizing. For sufficiently low values of drawbar stiffness, critical speed can be dramatically lower than the critical speed associated with a rigid drawbar. The mode of instability associated with low values of drawbar stiffness is different from that with higher values. Changes in drawbar damping significantly affect stability for sufficiently low values of drawbar stiffness, but not for higher values.

by D. B. Johnson; J. C. Huston; T. A. Gray
Iowa State Univ., Engineering Science and Mechanics Dept.
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p21-9
Rept. No. SAE-790183 ; 1979 ; 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by Iowa State Univ.'s Engineering Res. Inst.
Availability: In HS-026 402

HS-026 406

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES

A seven-degrees-of-freedom model of an articulated recreational vehicle is described and used to determine the relative significance of parameters and of degrees of freedom that affect lateral stability. Thirty-five parameters are used to describe tire-road interactions, roll freedom, suspension systems, geometry, mass distribution, the hitch, the drawbar, and the forward speed. Critical speeds associated with different systems are calculated; for a particular set of articulated vehicle parameters (e.g. weights, moments of inertia, dimensions), a critical forward speed exists above which constant speed motion in a straight line is unstable. It is concluded that roll freedom and roll steer must be included in the model, with the former not dependent on the presence of the latter. In such a model, decreasing the size of the powered vehicle or increasing the size of the towed vehicle is destabilizing. Negative front and positive roll steer of the powered vehicle are stabilizing. The change in critical speed due to an increase in front roll steer corresponds to that due to a comparable decrease in rear roll steer. Negative roll steer of the towed vehicle is destabilizing, and a certain amount of positive roll steer is stabilizing but large amounts dramatically lower critical speed. Cornering stiffness values are critical, more so for the powered vehicle. Cornering stiffness and roll steer coefficient changes are the most significant. Hitchpoint location changes do not significantly affect lateral stability. The addition of hitch damping has almost no effect on lateral stability. Over a wide range of values, changes in drawbar stiffness and damping are not significant. However, for sufficiently low values of drawbar stiffness, these two parameters become extremely important; in such cases, the critical speed is also very sensitive to roll parameter changes of the towed vehicle.

by J. C. Huston; D. B. Johnson
Iowa State Univ., Engineering Science and Mechanics Dept.
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p31-9
Rept. No. SAE-790184 ; 1979 ; 13refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by Iowa State Univ. Engineering Res. Inst.
Availability: In HS-026 402

HS-026 407

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES

The steady-state turning behavior of vehicles pulling trailers is formulated in a simplified manner using the concept of a handling diagram. The handling diagram graphically relates steer angle, path radius, and speed. The formulation assumes small slip angles but admits a nonlinear relationship between the slip angle and side force of the tires. The handling diagram concept can be used on more elaborate linear models by replacing the real slip angles and stiffness of tire pairs with their effective slip angles and stiffness. This work parallels that of Pacejka (1973) which was done for a single vehicle. It is noted that the method for determining jack-knife stability disregards flutter properties of the trailer.

by Chris E. Passerello
Michigan Technological Univ.
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p41-5
Rept. No. SAE-790185 ; 1979 ; 3refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 402

HS-026 408

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES

Approximate factors, measurement techniques, and test procedures are provided which can be used to determine the stability of trailers being towed by cars. The recommended performance measure is damping ratio, or an equivalent cycle to half amplitude, which is evaluated via a pulse-steer procedure at some reference speed. A minimum damping ratio criterion of 0.15 at 55 mph is suggested and compared to the results of recent full-scale tests. The approach is useful in selecting a minimum value of hitch load (for various weights of tow cars) that will ensure a minimum acceptable level of trailer stability at highway speeds. Improved trailer damping can be obtained by designs that stress low inertia, long wheelbases, heavy-duty tires, and large tow-car-to-trailer weight ratios.

by Richard H. Klein; Henry T. Szostak
Systems Technology, Inc., Hawthorne, Calif.
DOT-HS-7-01720
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p47-53
Rept. No. SAE-790186 ; 1979 ; 11refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 402

HS-026 409

STEADY TURNING OF TWO-WHEELED VEHICLES

After a brief review of studies on the dynamics of two-wheeled vehicles, steady turning of two-wheeled vehicles is analyzed in terms of a theory which accommodates large lean angles and a realistic representation of wheel-roadway interaction. Quantitative and qualitative relationships between rider and bicycle behavior are explored in detail and the effects of vehicle parameter changes on motorcycle behavior are examined. A description of the vehicle, the definitions of symbols used, and the equations underlying the analysis are presented. The method of solving the equations is discussed, and results of numerical solutions are presented in graphical form and discussed. This study furnishes the basis for the design of experiments that could be used to gain valuable insights into the interdependent forces on a turning two-wheeled vehicle and rider.

by Guy K. Man; Thomas R. Kane
Stanford Univ., Dept. of Mechanical Engineering, Stanford, Calif.
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p55-75
Rept. No. SAE-790187 ; 1979 ; 33refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 402

HS-026 410

OFF-ROAD STABILITY OF RECREATIONAL VEHICLES

An attempt is made to lay the analytical foundations for a theory of the stability of off-road recreational vehicles, using the theory of ship stability rather than the traditional theory of on-road vehicle stability. The type of terrain most applicable to this approach is a sloping terrain with many rocks and potholes inducing significant angular perturbations of the vehicle. The linear theory is discussed, as well as driving on a rough slope, pitching, vertical oscillations, and large angles. The methods of catastrophe theory as originally presented by Zeeman are used in an attempt to explain the behavior of the off-road vehicles.

by A. M. Strauss
University of Cincinnati, Engineering Science Dept., Cincinnati, Ohio
Publ: HS-026 402 (SAE-SP-443), "Dynamics of Wheeled Recreational Vehicles," Warrendale, Pa., 1979 p76-80
Rept. No. SAE-790188 ; 1979 ; 5refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 402

HS-026 411

EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES

Fifteen fresh cadaver impacts were conducted in simulation of pedestrian-automobile accidents. The test sled configuration simulated an automobile bumper and hood in "standard" and "nose-dive" situations as well as "hard" and "soft" impact surfaces. Instrumentation and film demonstrated large axial compression forces in the struck leg and considerable angular velocity of the torso in all modes. Dissection revealed primary injury at the impact site at low velocities with added remote injury at high velocities. Fracture of the lateral tibial plateau was most common. Lowering the bumper height offered the greatest protection against injury at moderate impact velocities.

by Edmund B. Weis, Jr.; Howard B. Pritz; Craig R. Hassler
Publ: Journal of Trauma v17 n11 p823-8 (Nov 1977)
1977 ; 10refs
Availability: See publication

HS-026 412

OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA

A survey of off-road vehicle accident injuries indicated a significant incidence of trauma; means of 931 serious injuries and 15 fatalities annually were reported for a three-county region of Southern California. A representative 78-bed community hospital in the desert region saw 542 patients with injuries related to off-road vehicle (dune buggies, motorcycles, four-wheel-drive vehicles) accidents over three years. Three-fourths of all patients had head injuries or injuries to the extremities; 47% of upper extremity and 31% of lower extremity injuries involved fractures. There were 37 isolated clavicle fractures. The majority of spine injuries were compression fractures in the thoracolumbar region. Characteristic injuries could often be related to the type of accident and vehicle involved. A survey of off-road vehicle enthusiasts showed that 21% had had an accident resulting in injury. Driver immaturity, poor judgment, and alcohol were identified as causative factors. Future planning must include attention to the sports enthusiast and medical services planning as well as an appreciation of the characteristic injuries resulting from this sport.

by A. Crane Charters; Gregory Schroedl
Publ: Journal of Trauma v18 n8 p596-600 (Aug 1978)
1978 ; 5refs
Presented at 37th Annual Session of American Assoc. for the Surgery of Trauma, Detroit, 15-17 Sep 1977. Includes comments by conference participants and Dr. Charters.
Availability: See publication

HS-026 413

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

The main components of low-cost freeway incident management are described, including the questions of quantifying the problem and of cost-effective selection of low-cost freeway incident management options for implementation. Emphasis is placed on the development of pre-planned response techniques, candidate jurisdictional agreements, traffic operational procedures for incident sites, and overall improvement of freeway incident management. This volume of the 6-volume report is designed to give police, highway, and traffic engineering administrators a conceptual understanding of the issues surrounding freeway incident management in less than an hour of reading time.

by G. L. Urbanek; R. W. Rogers
Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
DOT-FH-11-8813
Rept. No. FHWA-RD-77-58 ; 1978 ; 23p
Availability: NTIS

HS-026 414

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT

Seven candidate motor vehicle inspection and maintenance (I/M) program configurations were analyzed from the standpoint of costs, benefits, and other requirements, from which the State of Ohio will select one specific option. Recent data indicate that Ohio cannot attain National Ambient Air Quality Standards for carbon monoxide and nitrogen oxides by 1982, even if all reasonably available control technologies are applied. A firm schedule for implementing an I/M program is prerequisite to obtaining an extension of the compliance date. All seven candidate (I/M) programs have the following elements in common: idle mode testing, annual inspection, motor vehicle registration enforcement, and Ohio Environmental Protection Agency and Bureau of Motor Vehicles as administrative agencies. Major issues identified in setting up an I/M program include type of emission test (idle or loaded), geographical coverage, organizational approach (government, contractor, or private garage), frequency of inspection, and enforcement procedure. More specific design issues include types of motor vehicles to be tested, vehicle exemptions, data handling, mechanic training, quality assurance, consumer protection, and public education.

by David B. Ramsey; Lee A. Coda; Robert O. Phillips; Nancy K. Roy; Frederick M. Sellars; Thomas P. Snyder
GCA Corp., GCA/Technology Div., Burlington Rd., Bedford, Mass. 01730
EPA-68-02-2607-TO-16
Rept. No. EPA-905/2-78-006; PB-286 209; GCA-TR-78-38-G(1) ; 1978 ; 353p refs
Availability: NTIS

HS-026 415

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978

An introductory section discusses the need for electric vehicles (EV's) brought on by the energy crisis and pollution problems, the Lead Industries Assoc.'s EV program, the lead-acid type battery as the only viable power source for EV's at present and for the near term, electric energy for battery charging, and recycling as the key source of lead for batteries used to power EV's. A truck section discusses the use of electric pickup and delivery trucks in commercial fleets, the potential market for EV's in the major use categories of the U.S. commercial truck market, electric truck producers (Battronic Truck Corp., Electric Vehicle Associates, EVA-Chloride Electrovan Corp., Jet Industries, Inc., AM General), the Postal Service electric truck program, and the National Capital Region (division of the National Park Service) EV fleet (special service trucks, passenger car). A section on passenger cars presents a car[illegible]ule review of current electric passenger car manufacturers (S[illegible]ing-Vanguard, Elcar Corp., Electric Vehicle Associates, Inc., General Electric/Dept. of Energy, General Motors Corp.), describes various projects using electric passenger cars, and highlights typical new experimental cars (Globe-Union, Sears Roebuck and Co.). A section on buses describes activities of U.S. companies (Battronic Corp., Electric Vehicle Associates-Chloride Electrobus Corp.) presently producing battery-powered buses, and outlines the current use of electric buses in various operations throughout the U.S. A final section discusses the development of electrics in foreign countries (Japan, England, Italy, France, Holland, Germany, and Canada). Each page of the text contains photographs of EV's. Addresses of U.S. EV and battery manufacturers are listed.

Lead Industries Assoc., Inc., 292 Madison Ave., New York City, N.Y. 10017
Rept. No. LIA-L-24-20M-12-77 ; 1979? ; 28p
Availability: Corporate author

HS-026 416

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES

A study was undertaken to determine the magnitude and characteristics of safety problems, in terms of reported accidents, that are associated with moving vehicular traffic around and through highway maintenance and utility work zones. This was done by examining 280 maintenance and utility work zone accidents that occurred on the Virginia state highway network over a period of 14 months, representing approximately 0.4% of the total number of accidents reported during that period. A review of accident reporting procedures indicated the omission from the sample of a variety of work zone accidents where the roadway was not under physical repair (e.g., sweeping and landscaping) or where the first event in the accident was not related to the work activity (e.g., driver falling asleep). Several characteristics of the maintenance and utility work zone accidents are discussed, including general and specific locations of the accident, time of day, roadway and environmental factors, characteristics of the work zone, cause of the accident, and accident severity. Where data were available, comparisons were made between the maintenance and utility work zone accidents and all reported accidents. Recommendations for future research include studies to determine how much additional care should be taken by drivers in highway maintenance and utility work areas, and the most effective ways of communicating the need for increased caution. Highway work area traffic control procedures should be evaluated by criteria other than reported accidents, since the "Road Under Repair" designation may be interpreted differently by different reporting police officers.

by Bradley T. Hargroves
Federal Hwy. Administration; Virginia Hwy. and
Transportation Res. Council, Charlottesville, Va.
Rept. No. VHTRC-79R22 ; 1978 ; 45p 5refs
Availability: Virginia Hwy. and Transportation Res. Council,
Charlottesville, Va.

HS-026 421

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL

Driver car following patterns on freeways were investigated, particularly as a function of traffic flow level, using a headway distribution model. A number of "two-component" vehicular headway distribution models assume that vehicles on a road can be divided into two groups according to whether or not they are interacting with the vehicle ahead. A model of this type, the "semi-Poisson" model proposed by Buckley, is applied to a data base consisting of 42,000 observed headways from a single lane of an urban freeway over a range of flow from 900 to 2000 vehicles per lane per hour. A previously developed computational method allows the distribution of followers headways to be calculated directly from the observed total headway distribution by numerically solving an integral equation without introducing a parametric form for the followers distribution. The resulting followers headway distribution is found to be independent of the flow with a mean of 1.32 sec. and a standard deviation of 0.52 sec. No statistically significant discrepancies are found between the model results and the observed data. The theoretical basis for the semi-Poisson model is discussed and compared with those of other models in order to assess the plausibility of the interpretation with respect to car following. Evidence suggests that the capacity of freeways is generally limited not by the size of following headways acceptable to drivers but by the difficulty of producing a steady flow of traffic in which nearly all vehicles are followers. The flow independence of the followers headway distribution indicates that car following in freely flowing freeway traffic in the flow regime studied is essentially a nearest-neigbor interaction in which the individual driver is influenced mainly by the vehicle ahead rather than by more global aspects of the traffic environment such as the overall flow level.

by Paul Wasielewski
Publ: Transportation Science v13 n1 p36-55 (Feb 1979)
1979 ; 10refs
An account of this work was presented at the meeting of the Operations Research Society of America in Atlanta, 6-9 Nov 1977.
Availability: See publication

HS-026 422

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON

An attempt is made to furnish plausible explanations for some observed traffic-flow phenomena, based on known behavior of a pair of cars in a car-following situation. A fundamental psychophysical approach is applied deterministically in assessing actual driver performance. Observation of driver behavior in the traffic stream indicates that there are trajectories which loop clockwise in the phase (spacing/relative speed) plane. Based on these observations, and on a car-following equation appropriate for a two-regime (free-flow and congested-flow) phenomenon, an approximate limit cycle in the phase plane (switch-type behavior) is derived. The enveloping curves to these limit cycles may represent actual relatively close spacing conditions. It is realized that the intersection point of an approximate enveloping curve and a threshold curve for detecting relative speed at a given spacing has an important property, and may be associated with the critical spacing which represents transition between the congested-flow and free-flow regimes.

by Avishai Ceder
Publ: Transportation Science v13 n1 p64-79 (Feb 1979)
1979 ; 24refs
Availability: See publication

HS-026 423

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)

Motorized recreational vehicles (RV's) are discussed for the consumer. The five types of motorized RV's are described: motor homes on heavy-duty chassis, van campers in which bodies are converted to living accommodation, van campers equipped with partial life support systems, "chopped vans" or "mini" motor homes, and truck campers. The development of motorized RV's and their recent production history are outlined. The prices of RV types and incomes of RV owners are given. Arguments commonly heard for and against using a motorized RV (vs. a trailed unit) are enumerated. Some general advice is given concerning the selection of an RV, and servicing and maintenance of RV equipment are discussed. Addresses are provided for campground directories and services, magazines and publications, and for the Recreation Vehicle Industry Assoc. as a source of general information.

by Carl Edwards
Publ: Consumers' Research Magazine v62 n7 p33-6 (Jul 1979)
1979 ; 11refs
Pt. 1 is HS-025 746.
Availability: See publication

HS-026 424

HOW SAFE ARE FEDERAL-AID HIGHWAYS?

Safety reviews of Federal-aid highways were conducted in the 50 states during the winter and spring of 1978 by Federal Hwy. Administration (FHWA) and state highway agency resource personnel. The reviews had two objectives: to determine if recently completed highway projects were following current safety concepts of providing a forgiving roadside environment, high design standards related to roadway geometrics and surfaces, and adequate guidance and control for the road user; and to determine if older Federal-aid highways were being upgraded to current safety standards in a timely and effective manner. It was determined that current safety criteria and concepts are being incorporated into new Federal-aid construction, producing a safer highway environment. Progress made in the past ten years was seen in the use of breakaway sign and light supports and crash cushions, and clear recovery areas along the roadside. Some exceptions to the general highway safety quality of new highway projects included the continued use of curbs on high-speed roadways. The timely safety upgrading of older sections of Federal-aid highways was found to be still a major national problem. Only a few states have aggressively improved the safety features of their older Interstate system, and very little general upgrading of safety features is being accomplished on the non-Interstate Federal-aid system. It was found that because of either a misunderstanding of the performance of highway safety features (e.g. breakaway sign supports, cable guardrails) or because of rigid conformance to a specific design detail, the safety performance of the end product was sometimes compromised. It was also found that very few highway agencies were using accident data to evaluate the safety performance of highway features. The most serious problem encountered by the review teams concerned the wide variation in safety policy between different states and FHWA regions in such areas as pedestrian accommodations and narrow bridge warnings.

by Clarke Bennett
Federal Hwy. Administration, Office of Hwy. Safety,
Washington, D.C. 20590
Publ: Traffic Safety v79 n6 p8-10, 27-9 (Jun 1979)
1979 ; 1ref
Availability: See publication

HS-026 425

TUNE UP YOUR BIKE FOR RIDING EASE AND SAFETY

Step-by-step instructions (and photographs) are provided for the bicycle owner for routine maintenance (tune-up) of his bike. Information is provided on lubricating cables and hand brake levers; adjusting brakes; cleaning and lubricating or replacing chain; cleaning, adjusting, and lubricating derailleurs; filing chainwheel teeth; and tightening loose spokes and truing wheels. A time-saving cable greaser sold by Yamaha called the Power Cable Injector is described in a separate section.

by John Schubert
Publ: Popular Mechanics v152 n1 p118, 122, 125, 127, 132 (Jul 1979)
1979
Availability: See publication

HS-026 426

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT

Computer simulation techniques were used to study the effects of gross vehicle weight (GVW) and other design and operating factors on fuel consumption of tractor trailer trucks. Vehicles were classified into eight GVW/axle configuration categories from 18 tons GVW to 44 tons GVW and three body types (platform, van, and tanker trailers). For each class, a representative vehicle was selected and its fuel utilization was calculated over a representative duty cycle. The effects were evaluated of plausible modifications to vehicle and engine design and operating parameters. The results show that some GVW configurations above the present legal limit (U.K.) of 32.5 tons can yield improvements in fuel efficiency provided that existing load factors are maintained. If a fleet were composed of vehicles on 5 axles at 38 tons GVW or 40 tons GVW, these fuel savings might be gained without causing additional road damage, if the fourth power law relating road damage to axle weight is applied. The use of vehicles on 4 axles at 36 tons GVW and on 5 axles at 44 tons GVW would increase road damage. Single-drive configurations are 4% to 5% more fuel efficient than double-drive configurations. Application of a package of possible economy measures has been shown to give 18% fuel economy improvement; the package includes the construction of lighter tractive units and trailers, reduction in aerodynamic drag, use of low governed speed engine matched to a suitable transmission, and use of a demand-actuated cooling fan.

by L. Gyenes
Transport and Road Res. Lab., Transport Engineering Div.,
Crowthorne, Berks., England
Rept. No. TRRL-SR-424 ; 1978 ; 33p 10refs
Availability: Corporate author

HS-027 520

STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA

Thirty papers are compiled which individually cover the following topics: protection of occupants of commercial vehicles by integrated seat belt systems; injury mechanisms to fully-restrained occupants; seat design and safety belt effectiveness; response of belt-restrained subjects in simulated lateral impact; shoulder belt and knee restraint performance in barrier crash simulations; side impact simulation using the CAL3D occupant simulation model; pedestrian injuries in real accidents and their relation to collision and car characteristics; comparison of passenger injuries in frontal car collisions with dummy loadings in equivalent simulations; influence of mass ratio and structural compatibility on injury severity of near-side occupants in car-to-car side collisions; femoral loads measured by a six-axis load cell; epidemiology of childhood motor vehicle-related accidents; past, present, and future of car seat safety; National Hwy. Traffic Safety Administration (NHTSA) child safety activities; some factors influencing injuries of child pedestrians struck by car fronts; child restraint evaluation by experimental and mathematical simulation; development of testing and evaluation of child restraint systems and child test dummies by NHTSA; tests and materials for school bus retrofit applications; head impact response comparisons of human surrogates; response of unembalmed cadaveric and living cerebral vessels to graded injury; differential tolerance of frontal and temporal lobes to contusion induced by angular acceleration; acceleration-induced shear strains in a monkey brain hemisection; intracranial pressure relationships in the protected and unprotected head; further validation of the Simulation Model of Automobile Collisions program; comparison of Part 572 dummy and human subject in submarining; biodynamics of the living human spine during -Gx impact acceleration; postural influences on thoracic impact; driver interactions with an inflating air cushion; 30 mph front/rear crash with human test persons; modification of Part 572 dummy for lateral impact according to biomechanical data; and evaluation of human tolerance in frontal impacts.

Society of Automotive Engineers, Inc., 400 Commonwealth
Drive, Warrendale, pa. 15096
Rept. No. SAE-P-82 ; 1979 ; 878p refs
Includes HS-027 521--HS-027 550. Conference sponsored by Wayne State Univ., and Univ. of Michigan, Hwy. Safety Res. Inst.
Availability: SAE

HS-027 521

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS

Five different types of integrated seat belt systems (i.e. belt anchorage incorporated in the seat) were evaluated in frontal crash experiments at an impact speed of 35 kph, using dummies in a truck cab on a catapault unit. Results were compared with those obtained with conventional three-point belts and with unrestrained dummies. The experimental results show that when the dummy was unrestrained or protected only by a lap belt (even if integrated), the upper load limits used as protection criteria were far exceeded because of the heavy impact on the steering wheel; this did not apply to the three-point belt systems. Very favorable forward displacement kinematics were achieved using special seats of adequate structural strength with integrated three-point belt systems; the load on the occupants' bodies was within acceptable limits, and the occupants did not hit hard against the cab interior. The experiment showed that a vibration-absorbing seat with integrated three-point belt and additional supports fitted to the seat and backrest is the optimum solution.

by Gert Ruter; Heinrich Hontschik
Battelle-Institut e.V., Frankfurt-am-Main, Federal Republic of Germany
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p1-16
Rept. No. SAE-791002 ; 1979 ; 2refs
Conference held in San Diego, 17-19 Oct 1979. Research sponsored by Bundesanstalt fur Strassenwesen (Federal German Road Authority).
Availability: In HS-027 520

HS-027 522

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS

Selected data are presented from a year-long accident investigation study in the Montreal (Canada) area of 74 cases where one or more fully-restrained (lap and shoulder) vehicle occupants received injuries of OAIS (Overall Abbreviated Injury Scale) 2 or greater. Only 11 of the accidents involved occupant injuries greater than OAIS 3. Over 85% of the 84 occupants (53 drivers, 31 right front passengers) had OAIS 2 or 3 injuries. For OAIS 2 and 4, a higher percentage of passengers, and for OAIS 3, 5, and 6, a higher percentage of drivers were involved. Fifty-five percent of drivers vs. 35.5% of passengers were injured in frontal impacts. Head injuries were sustained by 30% each of drivers and passengers. Over 15% of drivers vs. 4% of passengers had facial injuries. Eleven percent of drivers and 15% of passengers received chest injuries. The steering wheel was responsible for 25% of drivers' injuries. Restraint system webbing was responsible for 2.1% of drivers' and 11.4% of passengers' injuries. The near side was involved in 35%, and the roof in 45% of the cases in which intrusion increased injury severity. In no case did the restraint system retain the occupant so as to increase injury severity. Recommendations include a driver restraint system with a retractor which removes slack rather than simply tightens, replacement of Chrysler window blind retractor with a locking retractor, and greater occupant compartment integrity (especially vehicle roof and sides). Appended are a discussion of problems encountered during the study, and descriptions of the more severe OAIS injury cases.

by J. E. Shanks; A. L. Thompson
McGill Univ., Dept. of Mechanical Engineering, Montreal, Que., Canada
OSU-77-00110
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p17-38
Rept. No. SAE-791003 ; 1979 ; 12refs
Conference held in San Diego, 17-19 Oct 1979. Research sponsored by Ford Motor Co. of Canada and Transport Canada.
Availability: In HS-027 520

HS-027 523

SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS

Production seats and specially designed research seats were analyzed with respect to seat/safety belt interaction under frontal crash conditions in order to evaluate seat influences on three-point belt effectiveness. As Federal Motor Vehicle Safety Standard 208 loading criteria alone were determined to be insufficient for evaluation of the seat's influence on safety belt effectiveness, supplementary evaluation parameters of dummy kinematics were defined to analyze more or less biomechanically favorable points and directions of application of restraint forces on the vehicle occupant. It is concluded that optimization of the restraint system cannot be achieved until seat optimization is accomplished. Present safety regulations concerning head-on collisions concentrate essentially on the safety belt and not on seat and seat frame deformation characteristics. It is proposed that the design of a safe seat should begin with the design of the forward seating area to provide a seating reaction force of proper direction and magnitude, i.e. so that a balance of the moments at the pelvis and lumbar spine exists in interaction with the remaining external forces (lap belt forces and the force of inertia).

by Dieter Adomeit
Technical Univ. Berlin, Inst. for Automotive Engineering, Berlin, Germany
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p39-68
Rept. No. SAE-791004 ; 1979 ; 8refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 524

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT

Far-side lateral impacts were simulated using a Part 572 dummy and human cadavers (embalmed and unembalmed) to compare responses for several belt restraint configurations. Sled tests were conducted with a velocity change of 35 kph at a 10 g deceleration level. From field data, it was estimated that this velocity change of the laterally struck vehicle represents about an 80th percentile level for injury-producing lateral collisions. Subjects restrained by a three-point belt system with an outboard-anchored, diagonal shoulder belt (i.e. positioned over the shoulder opposite the side of impact) rotated out of the shoulder belt and onto the seat. The subject received some lateral restraint due to interaction with the shoulder belt and seatback. The subjects restrained by a three-point belt system with an inboard-anchored, diagonal shoulder belt (i.e. positioned over the shoulder on the side of impact) remained essentially upright due to shoulder belt interaction with the neck and/or head. Kinematic responses of the Part 572 dummy were generally similar to those of the cadaver subjects. Injuries were found in cadavers restrained by both shoulder belt configurations, but were more extensive to the cervical region for those subjects receiving direct neck and/or head loading from the belt. Limitations in the cadaver model and test environment, as well as the preliminary nature of the experiments, do not permit definitive conclusions on the significance or applicability of the injury data obtained to real accident situations. Appended is a discussion of the effect of age on intervertebral disc structure.

by John D. Horsch; Dennis C. Schneider; Charles K. Kroell; Frank D. Raasch
General Motors Res. Labs., Biomedical Science Dept., Warren, Mich.; University of California, Dept. of Pathology, San Diego, Calif.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p69-103
Rept. No. SAE-791005 ; 1979 ; 25refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 525

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS

Previous pendulum impact tests have shown that knee joint injuries and tibial-fibular fractures may occur when loads are directed against the lower leg rather than directly against the femur in the knee. In order to further improve understanding of lower extremity restraint mechanics, simulated frontal barrier crash experiments were conducted with unembalmed human cadavers and an anthropomorphic dummy restrained by two-point shoulder belts. In the first test, an experimental bolster was specifically positioned so that the cadaver's lower leg would strike the bolster, thus inducing restraining loads entirely below the knee joint. The analysis of occupant kinematics showed that the flexed knee rode over and forward of the low-positioned bolster. Restraint induced considerable shearing load across the knee joint. Bolster measurements indicated a peak load of approximately 4.0 kN per leg which resulted in a contralateral, central tear of the posterior cruciate ligaments. Factors influencing shoulder belt and knee restraint system performance were studied in the remaining experiments. Positioning the bolster to provide full knee contact and early femoral loading, and orienting the bolster face to reduce knee joint shear loads (approximately 38.5 degrees from horizontal) were identified as important parameters for improved performance of the knee restraint. The reaction force vector of the deforming bolster structure (approximately 32.5 degrees from horizontal) represented an additional independent factor in minimizing contact loads and in controlling occupant kinematics. Under these knee constraint conditions, an average peak bolster reaction force of 6.2 kN per leg (compared with a dummy femur load of 5.9 kN) did not result in injury to the lower extremity of four cadavers. It is indicated that a two-point shoulder belt and knee restraint system can control occupant kinematics and attenuate potential lower extremity injury during a 13.4 m/sec frontal crash simulation.

by David C. Viano; Clyde C. Culver
General Motors Res. Labs., Biomedical Science Dept., Warren, Mich.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p105-31
Rept. No. SAE-791006 ; 1979 ; 2refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 526

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL

By applying some advanced features of the CAL3D occupant simulation model, a single model incorporating the vehicle structure and a simplified occupant were developed for studying the sensitivity of occupant response to parameter changes in perpendicular, vehicle-to-vehicle side impacts, not involving vehicle rotation. Results of the model show qualitative agreement with published experimental results. Occupant responses are sensitive to the initial clearance between the occupant and the door inner surface, the stiffnesses of the front structure of the impacting vehicle, and the side structure of the impacted vehicle. Although door intrusion is an important factor affecting occupant response, it is hypothesized that the occupant response is more sensitive to the kinematics of the door than to peak intrusion. Door intrusion seems to affect the efficiency of the padding between door and occupant, i.e. thicker padding will be required to limit peak occupant responses to preselected levels for vehicles with lower side structure stiffness.

by Arvind J. Padgaonkar; Priyaranjan Prasad
Ford Motor Co.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p133-58
Rept. No. SAE-791007 ; 1979 ; 15refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 527

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS

Data are presented from an analysis of 3000 pedestrian/motor vehicle accidents which occurred in Germany during 1975 and 1976. The primary contact area in over half of the accidents was the outer third of the vehicle front end; the center of the front end was implicated in about 15% of the accidents. For 75% of injury-producing accidents, impact speeds were in the range up to 30 kph. Head and leg injuries, especially lower limb injuries, predominated. Abdominal injuries were frequent, with chest and vertebral injuries relatively infrequent. In frontal collisions, almost one-fourth of elderly adult pedestrians involved suffered a severe/fatal head injury. The elderly were overrepresented in fractures of the lower limb, pelvis, and upper thigh. Child pedestrians (20% of pedestrian casualties) had a very high incidence of head, chest, abdominal, and upper thigh injuries. Overall pedestrian injury severity was about the same for "v" and "pontoon" vehicle shapes, with some advantage for the v shape. Lower limb injuries were overrepresented for v forms, while a higher incidence of abdominal and upper thigh injuries were found for pontoon forms. Critical areas of pedestrian contact for v forms were windshield frame, windshield, and bumper/front end area. For the pontoon form, critical areas were the rear part of the hood/lower windshield frame area and the front edge of the hood. In one-fifth of the accidents, the windshield was destroyed. In critical/fatal injury accidents, 52.4% of windshields of v-form cars were destroyed, vs. 33% for pontoon-form cars.

by Maximilian Danner; Klaus Langwieder; Wilhelm Wachter
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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p159-98
Rept. No. SAE-791008 ; 1979 ; 30refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 528

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS

A method is presented which correlates injuries in real accidents with experimental dummy loadings, and is applied to injury data for 318 occupants wearing safety belts who were involved in frontal car-to-car collisions. The relationship of real and simulated accidents is based on an Equivalent Accident Characteristic (EAC) for defining accident severity. From analysis of accident and simulation data, a reference factor, delta v (velocity change), was established. By elimination of the accident characteristic delta v (the EAC) a direct relationship between real injury and dummy loading was established. Corresponding dummy loadings for subcritical Abbreviated Injury Scale values are given. The tolerance limit for fatal head injuries was found at about Head Injury Criterion 1600, a higher than previously assumed value. The tolerance limit of the chest of Severity Index 1000 was confirmed. For pelvic/abdominal injuries, the tolerance limit was determined to be 74 g.

by Klaus Langwieder; Maximilian Danner; Walter Schmelzing; Hermann Appel; Florian Kramer; Jens Hofmann
Association of German Automobile Insurers (HUK-Verband), Dept. of Automotive Engineering, Munich, Germany; Technical Univ. of Berlin, Inst. of Automotive Engineering
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p199-231
Rept. No. SAE-791009 ; 1979 ; 16refs
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Availability: In HS-027 520

HS-027 529

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS

An analysis of 1344 car-to-car side collisions which occurred in France indicated that the risk of serious or fatal injury to occupants of struck vehicles increases proportionally to the difference in vehicle mass ratios in favor of the striking vehicle. In-depth analysis of 90 collisions in which the side panel of the passenger compartment was impacted, revealed that the difference in mass ratios was not the principal determinant of injury severity. Injury frequency and severity correlated better with the amount of side panel intrusion occurring when the bumper and structure in front of the side rail of the striking car override the rocker panel of the struck car. Lightest cars are exposed to maximum intrusion, since the stiffest elements of the side of the body shell are rarely involved. When the struck car/striking car mass ratio is less than or equal to 0.85, the initial contact of the striking vehicle is located above the rocker panel in 65% of the cases. Overriding the rocker panel doubly penalizes the occupant seated perpendicularly to the intruding panel because it increases the depth of penetration (and, all things being equal, the occupant/panel contact velocity) and raises the point of intrusion so that the occupant's chest strikes a stiffened panel at the impact interface. Chest injury predominates for these near-side occupants, with pelvic and abdominal injuries occurring a little less frequently and head injuries much more rarely. An appreciable increase in protection could be afforded by stiffening the low parts of the body shell, just above the rocker panel.

by F. Hartemann; J. Y. Foret-Bruno; C. Thomas; C. Tarriere; C. Got; A. Patel
Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, La Garenne-Colombes, France; Hopital Raymond Poincare, Garches, France
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p233-59
Rept. No. SAE-791010 ; 1979 ; 6refs
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Availability: In HS-027 520

HS-027 530

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL

A six-axis femoral load cell was designed, fabricated, calibrated, and tested in an ATD (anthropomorphic test device) upper leg. The cell has linear characteristics with adequate output and dynamic response. Its output compared well with that of load cells mounted behind a knee bolster which was impacted by an ATD instrumented with this load cell. Although the axial load was found to be well below the present limit of Federal Motor Vehicle Safety Standard 208, the bending moments were found to be high. A conservative tolerance limit for axial load should be considered, and cadaver data are required.

by R. Cheng; R. A. Denton; A. I. King
Wayne State Univ., Detroit, Mich.
DOT-HS-7-01785
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p261-88
Rept. No. SAE-791012 ; 1979 ; 10refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 531

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS

Statistics are reviewed of the involvement of children in motor vehicle-related accidents in the U.S. and in various countries worldwide. In 1977 in the U.S. alone, there were 4700 motor vehicle-related deaths and over 180,000 disabling injuries of children from birth to age 14 years. A Washington State seat belt study is reported, covering accidents in which children were involved from 1 Jan 1970 to 31 Dec 1977. Results of this study show the beneficial effect of seat belts in reducing injuries and fatalities among children. The emergency room and hospitalization experiences at Mary Bridge Children's Health Center in Washington State during 1978 are cited to illustrate the medical impact on children of motor vehicle-related accidents. This brief survey demonstrates that motor vehicle-related injuries are common, that patterns of injury can be identified, and that remedial steps must be taken to reduce future accident rates.

by Robert G. Scherz
Mary Bridge Children's Health Center, Pierce County, Wash.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p289-305
Rept. No. SAE-791013 ; 1979 ; 12refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 532

CAR SEAT SAFETY--PAST, PRESENT, AND FUTURE

A brief historical review of the development of child car seat in the U.S. is followed by a discussion of one car manufacturer'

(Strolee of California) approach to the development of a philosophy concerning the "total performance" of a child seat. The development of child seats is traced from the early "hook-over" type, to the "hook-under" type, and then to the car seats built to meet Federal Motor Vehicle Safety Standard (FMVSS) 213, a standard based on static load tests. The course of action taken by Strolee in developing the next generation car seat is described. The company wanted to maintain the desirable features of its products (child's ability to see out, child comfort, reclinability, age span, price consideration, ease of installation, appearance, ease of child entry and removal) while meeting FMVSS 213 requirement as well as to make them compatible with dynamic testing requirements. To provide a suitable level of child safety, the company decided that the following items would have to be satisfied: contain the child within reasonable limits during 30 mph, 20 g type tests (20 mph side and rear impact tests also investigated), provide for child and parent comfort, make the seat useful for the entire age span a child would require, and make it attractive, easy to install, and easy for both child and parent to use. Examples are given of the difficulties and uncertainties facing the child car seat manufacturer in meeting the proposed FMVSS 213-80 which covers dynamic testing.

by Richard E. Hyde
"Strolee" of California
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p307-18
Rept. No. SAE-791014 ; 1979 ; 1ref
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 533

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES

The nature and magnitude are outlined of the problem of child fatalities in motor vehicle accidents (as passengers, pedestrians, or bicyclists). Special mention is made of children riding in the luggage space of station wagons and hatchback cars. In 1978, about 4,200 children died in motor vehicle accidents. Exclusive of early childhood diseases, approximately 16 percent of the child fatalities, ages 0-14, are the result of such accidents. The unrestrained child in a passenger car becomes a missile during a crash, projected to any part of the occupant area, and ejection from the vehicle is a major cause of death. Restraints for various age groups of children, such as belts and child seats, are discussed, and dynamic tests with anthropomorphic dummies are described, as well as plans for additional restraint studies and biomedical research. Proposals have been made to revise the child restraint system (FMVSS 213) to extend the scope to include infant carriers and harnesses in addition to child seats, and to require dynamic testing. Promising results have been obtained with vehicle soft front ends which are more forgiving to pedestrians. Public information programs to increase restraint usage by children are presented along with a discussion of behavioral countermeasures dealing with the pedestrian and bicyclist/motor vehicle accidents. Further research is recommended to obtain basic performance data on retrofit or after-market type padding and to prescribe standard testing methods (including those for flammability and toxicity) in order to upgrade the safety performance of older school buses. Operational and hardware problems are discussed concerning the safe transport of handicapped school bus and transit bus riders.

by R. Rhoads Stephenson
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p319-49
Rept. No. SAE-791015 ; 1979 ; 38refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 534

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS

The relative importance of child pedestrian accidents is considered by reference to national accident statistics for Great Britain. Data from a study using existing hospital and police records are used to examine the location of initial pedestrian contacts with the vehicle and the effects of initial contact on overall injury severity. In particular, the incidence of "run over" accidents is examined, and it is shown that, contrary to popular belief, the very young child is rarely run over when struck by the front of a car or car derivative. The injuries sustained by child pedestrians struck by the fronts of cars or light trucks/vans are described, and differences in injury patterns according to age examined. About three-fourths of all child pedestrians are struck by the front of a car (or derivative). The younger the child, the more likely the first contact is with the side of the vehicle. In general, children, once involved, are less likely to be killed than adults. The very young child is more likely to be killed than the older child, due to the young child sustaining a direct blow to the head or torso from the relatively stiff front edge of the hood vs. the older child's head striking the top surface of the hood. The effects of vehicle front end height on injuries is considered, and it is shown that when the front end height is 60%-70% of pedestrian height there is an increased risk of neck injury. Reducing the stiffness of the front structure and of localized stiff areas on the top surface of the hood is recommended to reduce the incidence of severe injuries in pedestrian/motor vehicle accidents.

by S. J. Ashton
University of Birmingham, Dept. of Transportation and Environmental Planning, Birmingham, England
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p351-80
Rept. No. SAE-791016 ; 1979 ; 8refs
Conference held in San Diego, 17-19 Oct 1979. Research sponsored by Insurance Inst. for Hwy. Safety.
Availability: In HS-027 520

HS-027 535

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION

Two child restraint system sled tests with a child cadaver and a three-year-old child dummy demonstrated some differences between the kinematical response of dummy and cadaver. Two mathematical models were formulated to evaluate child restraint performance, using the MADYMO program package, a general purpose, mathematical, dynamical model for crash victim simulation developed at the Res. Inst. for Road Vehicles (TNO), Holland, in collaboration with the Netherlands Inst. for Road Safety Res. (SWOV). A description is presented of the validated dummy and cadaver models, together with experimental and model results. A sensitivity study was conducted to provide better insight into the effects of various parameters on the child's response. To demonstrate the use of the model as a design tool, the results of a simulation using an energy-absorbing backstrap vs. the standard belt are presented. It is concluded that the mathematical model is a better simulation for the cadaver kinematics than the dummy.

by J. Wismans; J. Maltha; J. W. Melvin; R. L. Stalnaker
Research Inst. for Road Vehicles (TNO), Delft, Holland; University of Michigan, Hwy. Safety Res. Inst.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p381-415
Rept. No. SAE-791017 ; 1979 ; 18refs
Conference held in San Diego, 17-19 Oct 1979.
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HS-027 536

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)

The three-year-old child dummy Model VIP-3C, produced by Alderson Res. Labs. was selected, on the basis of its construction, kinematic responses, and measurement characteristics, to be further tested by the National Hwy. Traffic Safety Administration (NHTSA) as a device for evaluation of child restraint systems in automobile crashes. Static and dynamic tests were developed to calibrate this dummy, slightly modified and designated as the SA103C. Calibration involved the measurement of head and chest accelerations and the bending characteristics of the neck and lumbar section. Tests were conducted with four dummies at two labs (NHTSA's Vehicle Res. and Test Center, and the Univ. of Michigan's Hwy. Safety Res. Inst.) to account for any differences in measured responses. Four calibrated dummies were further evaluated in simulated frontal crashes in two representative child restraint-automobile crash environments to determine the repeatability of their responses obtained in replicated testing. Six repeated tests were made with each dummy in 30 mph impacts with the "GM Love Seat" (belt type) and with the Chrysler "Mopar" (shield type). Three repeated tests were made with each dummy at 20 mph with the GM seat's top tether straps disconnected. All four dummies gave repeatable measurements of head and chest accelerations and head and knee excursions, and were sufficiently sensitive to detect crash environment differences. Results of testing 23 different child restraint systems in 30 mph and 20 mph simulated crashes with infant and three-year-old-child dummies indicate structural failure of a number of these systems and the potential for dynamic testing to uncover these and other performance problems.

by Vladislav G. Radovich; Anthony R. Bayer; Joseph B. Benson; Kenneth N. Naab
National Hwy. Traffic Safety Administration, Washington, D.C. 20590; University of Michigan, Hwy. Safety Res. Inst.; Calspan Corp., Advanced Technology Center
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p417-61
Rept. No. SAE-791018 ; 1979 ; 15refs
Conference held in San Diego, 17-19 Oct 1979.
Availability: In HS-027 520

HS-027 537

TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS

Methods and materials were investigated that might be used to retrofit protective materials for older model school bus seats, modesty panels, and stanchions. Laboratory tests were conducted under Federal Motor Vehicle Safety Standard (FMVSS) 222 guidelines on these components, under conditions with and without commercial retrofit materials, using head and knee forms. Additional tests were conducted on five potential retrofit materials. From results of 390 tests, it is concluded that the dynamic portions of FMVSS 222 could be applied to older model school buses for retrofit applications. The seat back and modesty panel rails were found to be the most dangerous objects for potential facial injuries, while head contusion injuries appeared not to be a problem. It was determined that commercial materials are available that can be used to minimize facial injuries. Commercial retrofit padding satisfied FMVSS 222 knee and head form criteria on the seat backs but not seat back or modesty panel rails. Thicker commercial padding advertised as Ensolite, Rubatex, or Ethafoam did improve the force-energy values significantly and would be acceptable under FMVSS 222 criteria.

by Roger M. Zimmerman
New Mexico State Univ.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p463-95
Rept. No. SAE-791019 ; 1979 ; 6refs
Conference held in San Diego, 17-19 Oct 1979. Research sponsored by National Hwy. Traffic Safety Administration.
Availability: In HS-027 520

HS-027 538

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES

The response of the head to impact in the posterior-to-anterior direction was investigated with live anesthetized and postmortem primates, in order to relate animal test results to previous head impact tests using cadavers, and to study the differences between the living and postmortem state in terms of mechanical response. The three-dimensional motion of the head, during and after impact, was derived from experimental measurements and expressed as kinematic quantities in various reference frames. In addition to standard anatomical and predefined laboratory reference frames for describing head motion kinematics, Frenet-Serret frame fields were used. The experimental technique used a nine-accelerometer system, mounted rigidly to the head, to measure head motions. Additional measurements included impact force, epidural pressure, and strains in the skull bone. High-speed cineradiography (1000 frames/sec) was used during the impact. The effects of the following factors are discussed: relative magnitudes of brain mass, skull mass, and external soft tissue mass; head surface geometry at the impact site, and mass distribution; and differences in epidural pressures and in head trajectories.

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University of Michigan, Hwy. Safety Res. Inst.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p497-541
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Availability: In HS-027 520

HS-027 539

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY

An investigation was undertaken of the propensity for rupture of living and unembalmed cadaveric canine cerebral vessels when subjected to similar injury. A 10 g mass was dropped from varying heights onto the exposed brain in both the living and cadaveric states. The postmortem cerebral vessels were reperfused with an ink marker at living pressures to simulate normal vascular distention with blood. Both living and cadaveric vessels ruptured in response to the same energy (100 cm gm. to 400 cm gm.) and failed to rupture below these levels (50 cm gm.). It is suggested that the physical integrity of postmortem cerebral vessels is adequate for the vessels to serve as indicators of brain injury in response to various loads. This vascular injury should be more pertinent to the investigation of traumatic brain injury than the propensity of load to fracture the skull, since the occurrence of skull fracture in trauma is inconsistently related to brain injury.

by Randall W. Smith
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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p543-60
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HS-027 540

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION

An analysis was made of frontal and temporal lobe contusions of rhesus monkey brains that were caused by a single sagittal plane angular acceleration impulse. At neuropathological exam, the depth, extent, and location of contusions were mapped and described according to a classification previously developed for human subjects. Of 30 monkeys subjected to the single impulse, 13 had no frontal or temporal contusions (Group 1), 8 had only frontal contusions (Group 2), and 9 had temporal contusions (Group 3). Correlation with angular acceleration, tangential acceleration, and tangential force showed that the three groups were statistically different. The mean peak positive tangential force for Groups 1-3 was 541, 659, and 766 newtons, respectively. This suggests that as mechanical impact increases, frontal contusions occur before temporal ones, and that the threshold is less for frontal than for temporal contusions. If this relationship is true, one would predict that, if there is sufficient input to cause a temporal contusion, a frontal contusion should also be present. In fact, in Group 3, 8 of the 9 animals with temporal contusions also had frontal contusions. Furthermore, the frontal contusions in Group 3 were statistically more extensive than either the frontal contusions of Group 2 or the temporal contusions of Group 3. These data support the concept that, in angular acceleration, the threshold for frontal contusions is less than that for temporal contusions. Since it is felt that the data best support the hypothesis that these contusions result from deceleration contact forces, the threshold differences relate to regional differences of mechanical input vs. differences in tissue mechanical properties.

by Thomas A. Gennarelli; Jacob M. Abel; Hume Adams; David Graham
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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p561-86
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HS-027 541

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION

A freshly dead Stumptail (Macaca speciosa) monkey brain hemisection model was subjected to translation, pure rotation, and a combination motion. Linear and angular head accelerations were measured, as well as brain displacement relative to the skull and shear strain at several locations. Much (4 times) higher than previously predicted shear strain was measured at acceleration levels which have been recorded during impacts which produced concussion in live monkeys. Pure rotation produced the highest, most diffuse, and longest lasting shear strain and brain displacements, while translation produced very low shear strain. Highest shear strain during rotation was recorded in the brainstem rather than on the periphery as many have predicted. Results suggest that the mechanism of brainstem injury, regardless of head motion, is due to shear caused by stretching of the cervical cord. The model is inadequate to show that stretching can occur in translation if relative motion between neck and head occurs.

by V. R. Hodgson; L. M. Thomas
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N00014-75-C-0975
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p587-611
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HS-027 542

INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD

Research was continued on closed head impact in the human cadaver and an associated mathematical model, the long-term goal being to describe relationships between head impact events which might be useful in understanding what occurs in the living human. In the current study, two different sets of experiments were conducted: sequential impacts on a single embalmed specimen with helmet, and impact experiments on individual unembalmed specimens with helmets. Measured impact parameters and intracranial pressures are discussed. A finite-element model is presented which can predict the intracranial pressures throughout the brain for the first 8 msec. It is apparent that the helmet prevents high-magnitude, short-duration intracranial pressures. The highest positive pressures develop in the frontal lobe and propagate in the posterior direction. Low-magnitude, negative pressures develop in the posterior fossa during head acceleration and propagate in the anterior direction. Positive posterior pressures develop after the acceleration phase.

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OH-00404-04
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p613-36
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HS-027 543

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM

To improve the utility of the SMAC (Simulation Model of Automobile Collisions) program and to assess its limitations, 12 vehicle-to-vehicle collisions were staged and then reconstructed with the program. A variety of impact configurations included 60 degree front-to-side, 90 degree front-to-side, 10 degree offset head-on, and 10 degree offset rear-end. Agreement between the measured data and the SMAC reconstructions was found acceptable. The final rest position, velocity change, and damage profile of the vehicles were used to assess the accuracy of the simulations. The vehicle rest position was, by far, the most sensitive parameter to variation in input changes. Velocity change was the least sensitive; fine tuning the input to obtain an acceptable match with rest position, in general, had little effect on predicted velocity change. Of the collision configurations, the 60 degree front-to-side was the most difficult to reconstruct. This was attributed to the lack of any corner stiffness effects in the simulation of the vehicle structure, such that the onset of the collision interface in the struck vehicle was not steep enough. In a number of collisions, one or more of the wheels on a particular vehicle became airborne. Since the program does not include weight transfer effects, simulation of these effects was limited to setting the cornering stiffness to zero on the appropriate wheels, obviously only a partial solution.

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DOT-HS-7-01511
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p637-74
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HS-027 544

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING

In an effort to determine why Part 572 dummies have a greater tendency to submarine than human cadavers in car crash tests, differences in their pelvic shapes and abdominal flexibilities were studied. Anthropomorphic data were obtained on human volunteer subjects, the Part 572 dummy, and 28 human skeletons; X-rays were taken of the volunteers and the dummy; a comparative study was made of the pelvic triangles of the skeletons, the dummy, and FAA-USAF NHTSA model; static tests of abdominal flexibility were conducted on the dummy and volunteers with variations in the tension of the seat belt, which was placed on the abdomen over the sartorius. Results demonstrated that the differences in the direction of the sartorius, or upper notch (situated between the anterior-superior and anterior-inferior iliac spine), in the pelvic position relative to the vertebral column in the sitting position, and differences in the abdominal flexibility are the main reasons for the submarining difference between the Part 572 dummy and the human subject. Consequently, the shape of this notch, the foam rubber in the abdominal portion, and the whole abdominal insert of the Part 572 dummy were modified. A transducer was designed to measure directly the compression load when the lap belt intrudes into the abdomen during dummy submarining. This affords a practical method for establishing the abdominal injury criteria of submarining. Some car crash tests on the modified dummy and the current dummy equipped with transducers produced satisfactory results.

by Y. C. Leung; C. Tarriere; A. Fayon; P. Mairesse; A. Delmas; P. Banzet
Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, La Garenne-Colombes, France; U.E.R. Saints Peres, Laboratoire d'Anatomie, Paris, France; Hopital Saint Louis, Paris, France
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p675-719
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HS-027 545

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION

Spinal kinematics of living human volunteers (students aged 18-25) undergoing -Gx impact acceleration are described, along with experimental procedures followed in data acquisition. Four males and three females were subjected to impacts in the tensed and relaxed mode from two g to eight g, in one g increments. Their lower extremities were clamped tightly to the impact seat, and the pelvis was restrained by a lap belt. The biodynamic response of the living spine was found to be quite similar to that of the cadaveric spine, particularly in terms of T1 displacement, acceleration at T1, and flexural resistance. Females have a weaker neck musculature and tended to withdraw from the test program at lower g levels than males because of transient neck pain.

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DOT-HS-5-01232
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p721-63
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HS-027 546

POSTURAL INFLUENCES ON THORACIC IMPACT

The influence of body posture, and inherent support, on thoracic impact response was investigated in an animal model. Six anesthetized and six postmortem, domestic, male swine were exposed to blunt, midsternal loading while supported in their natural quadrupedal posture, and the results were compared with previously reported data from similar tests involving an upright body orientation. Each animal was impacted once by a 21 kg, rigid mass with a flat contact interface moving at a nominal velocity of either 8 m/sec or 10 m/sec. Measured mechanical responses included applied load, sternal and spinal accelerations, thoracic compression, and aortic overpressure. Injury response was assessed from a thoracico-abdominal necropsy. Electroencephalograph (ECG) traces were recorded pre- and post-impact to monitor electrophysiological response. Anesthetized animals suspended in their natural posture sustained serious pulmonary hemorrhage without skeletal damage, whereas the upright-suspended subjects suffered multiple rib fractures and instances of liver laceration. ECG changes occurred in both postures, although these were generally minor for the quadrupedal orientation. Ventricular fibrillation did not occur in any natural posture test despite peak sternal accelerations up to 1300 g's, but occurred in all upright posture tests with peak sternal accelerations exceeding 700 g's.

by Mary E. Pope; Charles K. Kroell; David C. Viano; Charles Y. Warner; Stanley D. Allen
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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p765-95
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HS-027 547

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION

Mechanical driver surrogate interactions with an inflating air cushion mounted on the steering wheel (General Motors' air cushion restraint system (ACRS)) were studied using test environments with various initial occupant-air cushion separations or air cushion module modifications. Static tests using a rigidly-mounted body block placed in the path of the inflating cushion showed how interaction forces might be developed when the body block interacted with the inflating cushion. The magnitude of the peak interaction force was an inverse function of the initial separation between body block and cushion. When the body block was initially in close proximity of the cushion, the interaction force was characterized primarily as a pressure existing between the steering assembly and the body block, peaking during the early phases of cushion unfolding. The lack of whole body motions and the rigidity of the body block have an effect on interaction forces, and the test responses do not address the responses of a human in such exposure. Static and dynamic inflation tests performed with the Hybrid III thorax placed in line with the path of the ACRS provided a more realistic simulation. The Hybrid III dummy allowed whole body motions, body articulation, and chest compression, although there are many differences between the dummy and car occupants. Peak chest compression was considered the best of the measured responses to compare the dummy-ACRS interaction for the various test conditions.

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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p797-823
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HS-027 548

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS

A test program was undertaken in order to prove that a human subject in a standard automobile, wearing a standard lap and diagonal seat belt, can withstand a certain, precisely-defined level of accident severity without sustaining any injuries, and to establish whether there are differences in the loading imposed on a human subject and a test dummy at this level of accident severity. Following a series of sled tests using human volunteers and Hybrid II dummies, front/rear crashes at 30 mph using standard Audi 80 cars were conducted with the human and dummy subjects in the driver's position, wearing a lap/shoulder belt. Results demonstrate that a human driver in a standard automobile and protected by a standard seat belt system can withstand an accident of a certain severity without being injured. It was established that both the belt forces and the head acceleration values are considerably lower with human occupants than with test dummies. This is largely related to the fact that the human driver can brace himself with his arms on the steering wheel. The results could conceivably be extrapolated for higher accident severity levels.

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Audi NSU Auto Union A.G.
Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p825-40
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HS-027 549

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA

The Part 572 dummy was modified in order to improve its performance in lateral impact studies. The rib cage, arms, and shoulders of the dummy were modified so its impact performance more closely simulates that of a human. Based on biomechanical data obtained on cadavers during lateral collision tests, the Part 572 arm was modified by reducing the size of the structural members and increasing the padding, and the mobility of the shoulder was increased in both forward and upward directions. The shoulder was modified to become transversely collapsible to a certain degree. The rib cage was redesigned to give a more realistic deformation. The measurement of lateral chest deflection was also incorporated into the rib cage design, while frontal impact characteristics were left unchanged. Results of freefall and full-scale crash tests, both frontal and lateral impacts, are compared for the modified dummy and cadavers. Preliminary results are encouraging; further developments are expected.

by R. L. Stalnaker; C. Tarriere; A. Fayon; G. Walfisch; M. Balthazard; J. Masset; C. Got; A. Patel
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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p841-72
Rept. No. SAE-791031 ; 1979 ; 8refs
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HS-027 550

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS

Results are analyzed of ten accident reconstructions of five actual frontal car collisions which involved nine restrained occupants. The reconstructions were first carried out using dummies, and then using cadavers. Injuries sustained in the real accidents are compared with the injury criteria values recorded for dummies, and with injuries and injury criteria values found for cadavers. From the results, it appears that an Abbreviated Injury Scale 3 head injury in a real accident can be associated with a lower value than the 500 Head Injury Criterion value recorded for the Part 572 dummy. There was a large scatter in chest injury criteria values; for protection of almost all occupants, a limit value should be chosen that is lower than the proposed value of 60 g's. The cadavers showed more extensive thoracic fractures than the actual passengers under the same crash configuration, taking into consideration the Eppinger theory concerning the number of fractures related to age, weight, and shoulder belt force value. The results confirm that the fresh cadaver, under certain conditions, is a satisfactory model for biomechanical studies.

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Publ: HS-027 520 (SAE-P-82), "Stapp Car Crash Conference (23rd) Proceedings," Warrendale, Pa., 1979 p873-914
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HS-027 598

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS

The literature is reviewed pertaining to characteristics of individuals arrested and convicted for driving while intoxicated (DWI). Summaries and/or typical examples of the data found in the reviewed papers are given for various social and personal demographic characteristics. Appended are abstracts of selected references, and tabulated statistics comparing characteristics of control drivers (i.e. all drivers randomly selected to represent the total driving population), DWI's, and alcoholics. The data clearly suggest that the current population of DWI's contains a high proportion of alcohol abusers who are likely to be repeat DWI offenders. A composite profile of the DWI driver indicates that he is most often a male, aged 30 to 45 years. He is more likely to be separated, divorced, or widowed than the control driver. He has less education, less income, and greater unemployment or job difficulties due to his drinking. He reports drinking more often and with larger quantities of alcohol than the control driver. There are indications of psychosocial disturbances with drinking behavior reflective of stress and difficulties. The DWI driver has a worse driving history and drinks and drives more often than the control driver. On variables which indicate problem drinking behavior and life disturbances, DWI drivers resemble alcoholics. The DWI requires a serious, comprehensive program to counter his trends toward alcoholism. Positive outcomes require speedy and thorough intervention. Based on experience with treating alcoholics, it is considered that rapid progress in overcoming DWI problems is unlikely. Countering the drinking driving problem requires some means of reversing the behavior of drinking drivers who are not apprehended as DWI and who appear to differ in characteristics from the DWI.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p9-79
1979 ; 34refs
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Availability: In HS-804 857

HS-027 599

DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE

It is emphasized that all DWI (driving while intoxicated) probation functions of the National Hwy. Traffic Safety Administration's Alcohol Safety Action Projects (ASAP's), including screening, reporting, classification, referral, and coordinative functions, should be the sole responsibility of the existing probation office responsible for that particular jurisdiction. On occasion, enabling ASAP-type legislation has been introduced, usually by a state highway department, and often even passed by state legislatures with no coordination through probation systems at any state or local level. Because of this fragmented planning, problems have been imposed upon local probation offices which lacked sufficient staff to effectively handle the additional caseload, or sufficient community resources for referral of DWI offenders. By not interfacing with existing probation agencies at the local, state, or even Federal level, the ASAP-type DWI probation office was often set up on an unsound basis of probation organization or management. Various attempts at evaluating drinking-driver probation programs, for the most part, have failed to recognize the need to evaluate the probation phase, its operations and administration. With a built-in mechanism for the evaluation of the quality of casework and supervisory services within a DWI probation office, there is no way to ensure that the offender is being provided the best services.

by Randy J. Polisky
American Probation and Parole Assoc.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p81-97
1979 ; 9refs
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HS-027 600

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS

An evaluation was made of the efficacy of three treatment approaches (mandated licensing controls, no licensing action, or participation in a 12-month alcohol abuse treatment program) as traffic safety measures for California drivers convicted of multiple DUI (driving while under the influence) offenses. Standard fines and/or jail sentences were used in all three approaches. Statistical analyses of subsequent driving records demonstrated that the use of mandated licensing action (suspenion or revocation) in addition to fines and/or jail sentences had a more positive effect on traffic safety than the use of only fines and/or jail sentences or the use of fines and/or jail sentences in combination with a 12-month alcohol abuse treatment program. Both the magnitude and duration of the effect of the individual treatment approaches in terms of subsequent DUI or accident involvement are documented.

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OTS-057701
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p99-125
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HS-027 601

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)

The background is reviewed of the National Hwy. Traffi Safety Administration-sponsored Short Term Rehabilitatio

(STR) Study for DWI (driving while intoxicated) offenders. Problems encountered in implementing the study and some actual and potential solutions to these problems are discussed. The 1975 STR Study involved the conduct and evaluation of rehabilitation activities at 11 Alcohol Safety Action Project sites. Treatment modalities included alcohol safety schools, non-PMT (Power Motivation Training) group therapies, and individual therapy as well as PMT. Explicit experimental designs which employed procedures for random assignment of DWI clients to treatment or control groups were developed at each of the sites. The study was designed to provide an empirical demonstration of the effectiveness of short-duration, court-supervised rehabilitation programs for DWI offenders. A critical requirement was the development of procedures to randomly assign clients to treatment and no-treatment categories. The 11 sites also assumed significant responsibilities for the collection of various data for evaluation purposes. Discussed are the experiences with gaining acceptance of the use of random assignment to treatment and the use of no-treatment control groups, the implementation of random assignment, determining evaluation criteria, and data collection problems.

by David L. Struckman-Johnson; Vernon S. Ellingstad
University of South Dakota, Human Factors Lab.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p127-37
1979 ; 8refs
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HS-027 602

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH

The philosophical and empirical developments are examined which have occurred within the ASAP (Alcohol Safety Action Project) education and rehabilitation programs over the past decade. A number of regrettable, yet not unpredictable failures, both of the ASAP intervention approaches and of the methods that have been used to evaluate them are addressed. It is suggested that the ASAP may have been both a success and a failure. The most pressing problem currently confronting the ASAP system is to understand its positive and negative results. Unfortunately, the evaluation technologies which have been applied to the system to date have been incapable of sensitive analysis. It is suggested that recent trends in theory and practice of both alcohol abuse treatment and program process and outcome evaluation have much to offer the ASAP countermeasure approach; these emerging concepts are detailed. Rules for performing treatment outcome evaluations in the alcohol field (pretreatment measures, treatment outcome measures, and follow-up procedures) are outlined.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p139-72
1979 ; 49refs
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HS-027 603

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)

The opportunity for judges, through the constructive use of the power of their office, to direct persons convicted of alcohol-related (A/R) offenses to the most suitable treatment, is discussed. With the exception of a few outstanding court-oriented alcoholism prevention and rehabilitation programs, most courts are still using the traditional, nonproductive jail and fine approach. A careful investigation of the relatively few successful programs indicates that success is directly related to an individual judge's education and motivation toward an enlightened approach in helping an individual overcome alcohol abuse or alcoholism through education and counseling, while utilzing community resources. In most cases, the lack of successful programs in the majority of courts can be directly attributed to the lack of motivation and, to a lesser extent, to the lack of appropriate education of individual judges. Judges, in common with the general public, have been subjected to a very strong cultural bias against the alcoholic and a very strong media bias against the DWI offender. Judges typically view these persons as deserving of some type of punishment, and apply the traditional jail and fine approach rather than innovative ways of treatment. These attitudes can be changed if a process of judicial education is implemented. An outline is presented of a model for a weekend educational seminar for judges concerning alcohol and A/R driving offenses.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p173-81
1979
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Availability: In HS-804 857

HS-027 604

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?

It is expressed that society (and the justice system in particular) has not yet made a decision on how to deal with the crime of driving under the influence (DUI) of alcohol or other drugs, what penalties are proper and effective, how to provide an enforcement capability, and whether or not this is a major crime deserving of priority attention from the judicial system. Most conspicuously lacking in the justice system is any uniform direction; there are no practical and specific guidelines. The justice system is the most ideally equipped facet of society for providing motivation to the addicted driver to obtain treatment for his illness. The DUI crime constitutes a problem of top priority in the American justice system. Some concerned judges, especially in states where decriminalization followed the Uniform Intoxification and Alcoholism Treatment Act, are utilizing such diversionary practies as pre-trial probation, suspended sentences with probation, pre-sentence investigations, and civil commitments to treatment.

by Albert B. Logan
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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p183-7
1979
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HS-027 605

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER

The need is discussed for judges to understand the significance of a BAC (blood alcohol concentration) reading in DWI (driving while intoxicated) cases, to attempt to identify the potentially dangerous drinking driver, and to try to tailor the sentence to help the defendant overcome his dependency on alcohol. Judges, in giving great weight to BAC readings, tend to overlook revealing facts that could give them insights into a DWI offender's alcohol involvement. Judges can identify the existance of a drinking problem even though a defendant denies he has one, but many times they tend to empathize with a DWI defendant. Most judges and law enforcement personnel have no concept of the quantity of alcohol that must be consumed to reach a BAC of .10% (present legal presumption of intoxication) and higher. The BAC reading is a most useful indication of a person's drinking habits. Other suggested factors a judge should consider include the age of the defendant, time of day of arrest, where and why drinking took place, emotional state, the decision to drive when drunk, facts surrounding probable cause for a DWI arrest, and observations at the scene. A judge's role is to make some determination that a drinking problem exists, that a defendant before him may be potentially dangerous, and then to direct him into some treatment. A judge can tailor a sentence to the specific needs of a defendant, and must recognize his responsibility to highway safety goals inherent in all DWI laws.

by Nathan Kirsh
New Jersey Dept. of Health
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p189-202
1979 ; 2refs
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HS-027 606

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS

A discussion is presented of the Delphi Project (1976-1977) for establishing the varied perceptions by judges and other criminal justice officials of the most or the least effective driving under the influence (DUI) adjudication and referral (A and R) countermeasure actions. The Delphi Project tested two DUI A and R effectiveness hypotheses through Alcohol Safety Action Project (ASAP) judges and other ASAP criminal justice officials (CJO's) and non-ASAP judges. Contrary to Hypothesis I, non-ASAP judges rated DUI case referral processing measures higher in effectiveness than the adjudication and referral procedures, machinery and personnel measures. In accordance with Hypothesis I, non-ASAP judges rated alternative case processing and sanctioning techniques, and effectiveness measures and uniform policies measures lower in effectiveness than adjudication and referral procedures, etc. Contrary to Hypothesis I, ASAP judges and other ASAP CJO's held the same countermeasure views as non-ASAP judges. Contrary to Hypothesis II, both non-ASAP and ASAP judges and other ASAP CJO's rated DUI referral measures, such as providing for adequate referral and treatment capabilities, higher in effectiveness than adjudication measures, such as streamlined case disposition. Project background, the Delphi method (judgments obtained from each member of panel(s) of experts, with anonymous controlled feedback of group responses to each member, and development of a group consensus), project design and implementation, data analysis, and findings are described. Attached are a listing of action items that primarily improve driving under the influence of intoxicating liquor adjudication or case referral, a ranking of ten highest and lowest ASAP countermeasures by each of two panels (mean effectiveness and standard deviation calculations), and a detailed ranking of each countermeasure by category and subcategory.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p203-41
1979 ; 26refs
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Based on unpublished 1977 Master of Public Administration thesis, American Univ.
Availability: In HS-804 857

HS-027 607

AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)

It is argued that implied consent and per se laws will have to be amended so as to state explicitly a true law-science relationship. These amendments must include a concise statement that the usual presumptions are to be considered as interpretive of the test result at the time the test is given, and not as a standard of guilt of any offense. All breath analysis test results must be admissible in evidence subject to challenge for accuracy or for any inference to be made therefrom. Test results should be regarded as corroborative evidence of other facts that establish the corpus delicti of the DWI (driving while intoxicated) offense or as rebuttal evidence pertaining to affirmative defenses. The method for administering breath tests must follow the scientific analytical procedure of two blanks, two breath samples, and at least one standard test. Only tests performed within 120 minutes measured from the DWI occurrence should be considered as possibly probative of the DWI offenses, stated as 120 minutes from an on-view arrest situation and 90 minutes from arrest for any other offense. The refusal case should be heard as a summary proceeding following the DWI case, with judicial discretion to impose a penalty of suspension of driving privileges up to one year's duration. Such amendments will return enforcement procedures to a reliance upon detailed data collected by the police at the scene of the arrest, only to be corroborated by chemical test data. The detailed arrest information and data from the breath test are essential to convincing the offender of the guilt of the DWI offense, a precursor to entry into any time-saving-diversionary program and valuable in making a diagnosis of alcoholism. An amended Illinois implied consent law is appended.

by Richard W. Hall
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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p243-73
1979 ; 24refs
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HS-027 608

SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS

The content of a 13-hour (one evening, one day) seminar developed for state and local legislators on the subject of alcohol and highway safety, and application of the materials (pilot testing in Maryland and Iowa) are decribed. The primary purposes of the seminar were as follows: to inform legislators of the national, state, and local pictures of alcohol abuse and its effects on driving behavior and highway accidents; to make the lawmakers aware of the research data that support the alcohol countermeasures legislation recommended by the National Hwy. Traffic Safety Administration (NHTSA); to assure that legislators understand the potential impact of new laws on their state's alcohol-related traffic accidents; and to provide the basis for a plan of legislative action to draft and pass laws which structure the Alcohol Safety Action Project's drinking driver control system. Positive reactions from participants in the pilot tests indicate that the seminar project was successful in attaining the primary objective of raising the legislators' consciousness of the alcohol/highway safety problem. Seminar staff and NHTSA personnel concluded that the seminar, as originally conceived, was the most effective way to communicate the alcohol/highway safety information to state legislators. It was also concluded that the preparations and scheduling are most critical to seminar success. Specific recommendations for successful conduct of such seminars for lawmakers at all levels are outlined and cover scheduling, seminar host, location, group size, and resource personnel.

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DOT-HS-4-00985
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p275-85
1979
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HS-027 609

THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED

As the initial phase of a two-phase project on the visual detection of DWI (driving while intoxicated), an on-the-road study was conducted which resulted in the identification of visual cues and the development of detection procedures for effectively discriminating between DWI and DWS (driving while sober). (The second phase will field test the developed detection guide.) Statistical analyses of 1681 cue occurrences recorded during 643 detection events determined a set of 23 visual cues accounting for 92% of the cue occurrences. The cues are as follows: stopping (without cause) in traffic lane, following too closely, turning with wide radius, appearing to be drunk, driving on other than designated roadway, straddling center or lane marker, almost striking object or vehicle, slow response to traffic signals, headlights off (at night), signaling inconsistent with driving actions, weaving, tires on center or lane marker, drifting, swerving, accelerating or decelerating rapidly, slow speed (more than 10 mph below limit), fast speed (more than 10 mph above limit), failing to respond to traffic signals or signs, braking erratically, stopping inappropriately other than in lane, turning abruptly or illegally, driving into opposing or crossing traffic, and driving with vehicle defect(s). A cue is typically observed with one or more other cues, but few subsets of specific cues occur together frequently. There are large differences among cues in their DWI frequency, and in their ability to discriminate between DWI and DWS. Generally, conditions under which cues occur have little influence on their frequency. Patrol strategy (general vs. that with DWI emphasis) greatly affects relative observance frequencies.

by Douglas H. Harris
Anacapa Sciences, Inc.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p287-94
1979 ; 9refs
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HS-027 610

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING

A drinking-driving program, R.I.D.E. (Reduce Impaired Driving in Etobicoke), introduced in one borough of Toronto, Canada, is evaluataed. Based on evidence from previous campaigns judged effective, the program combined a highly visible "random" spot-check enforcement component with extensive media coverage and a drinking-driving educational component. A three-wave telephone survey showed significant increases in public knowledge of the drinking/driving problem and of the R.I.D.E. program. The subjective perception of arrest risk was increased for the "average driver" but not for "myself". Although only indirect evidence was available on driver behavior, this tended to indicate fewer impaired drivers on the road. Police-reported alcohol-related (A/R) accidents and injuries indicated an overall downward trend in Toronto, but the urban nature and restricted size of the experiment's geographic unit, as well as similar changes in control areas and data inconsistencies and bias, did not permit conclusive results to be drawn in terms of reduced A/R accidents and injuries, and lowering of blood alcohol concentrations.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p295-320
1979 ; 27refs
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Availability: In HS-804 857

HS-027 611

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES

Fourteen drivers were given practice and then used in four separate sessions under alcohol alone (0.08%), diazepam, (a minor tranquilizer) alone (up to 10 mg), both alcohol and diazepam, or no drugs, and tested in three driving tasks. The driving tasks were carried out on an airport taxiway in a full-size passenger car. The tests consisted of steering through a serpentine course at 25 mph to 40 mph; carrying out an evasive maneuver involving either a sudden lane change to the left or right, or a sudden braking maneuver involving stopping the vehicles as close as possible to a point on the road, from speeds of 25 mph to 40 mph; and a speed reproduction and maintenance task in which drivers had to attain a speed between 25 mph and 40 mph and maintain it as steadily as possible, without the use of the speedometer. The steering tests were clearly found to be affected by variations in task difficulty, manipulated by driving speed; and test-retest reliability was adequate. There was considerable intersubject variability in driving performance, as well as in the effects of alcohol and diazepam. Significant decrements in performing evasive maneuvers resulted after ingestion of alcohol and/or diazepam, and a similar, but not statistically significant trend was found for steering in the serpentine course. No significant drug effect was found in terms of speed reproduction, speed maintenance, or controlled braking performance. There was no significant interaction of alcohol with diazepam.

by R. G. Mortimer; P. R. Stubing; P. A. Howat; D. B. Stone
University of Illinois at Urbana-Champaign
Publ: HS-804-857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p321-41
1979 ; 31refs
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Availability: In HS-804 857

HS-027 612

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS

The development and evaluation is described of an educational program entitled "Senior Adults, Traffic Safety and Alcohol," designed to alert senior adults to their special vulnerability to traffic fatalities and the role of alcohol in these tragedies as well as in some of the other personal and social areas of their lives. The program was developed and evaluated in the following six steps: a survey of the population for whom the program was intended, establishment of goals, writing and field testing of a criterion instrument, design and production of program, field testing of program, and analysis of program. The one-hour program consists of an 11-minute animated film and an accompanying six-page pamphlet, and a discussion period. Evaluation results show that the experimental subjects, when compared with control subjects, achieved a higher score on the knowledge measure, exhibited more positive attitudes, and indicated more positive behavioral intentions. (The total package comprises the animated film, take-home pamphlet, a leader's guide, and a manual that discusses all aspects of the program. It is available through the AAA Foundation for Traffic Safety, 8111 Gatehouse Rd., Falls Church, Va. 22042.)

by Darlene J. Winter
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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p343-55
1979 ; 24refs
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Availability: In HS-804 857

HS-027 613

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER

The steps in creating a Youth Alcoholism Program in the Prince George's County Health Dept., Maryland, are described: establishing the need, developing a philosophy, formulating a program, finding the funding, and selling the program. By applying knowledge gained from the administration of an adult DWI (driving while intoxicated) program, utilizing existing resources, and charging fees, a program was developed especially designed to meet the needs of youthful alcohol abusers. The seven-week curriculum (each session approximately two hours in length) is as follows: general introduction, getting acquainted, feelings about arrest; examination of attitudes, why people do or do not drink; facts about alcohol, effects on body; exploration of problem and dependent drinking; identification of signs and symptoms of problem drinking, assessment of personal drinking behavior, influence of peers, family, decision making; drinking and driving; and personal plans, evaluation of course, final examination. All participants have an individual evaluation prior to the start of school which enables the counselor to determine the extent of the alcohol problem, to explore any other situational disturbances, and to make any immediate referrals if necessary. After the seven weeks, the client is reevaluated; and if further treatment is required, he is referred to the appropriate program. A unique feature of the program is family involvement at a meeting held prior to the beginning of classes. A modest fee is charged each client, but no client is refused service because of inability to pay. The fees are used to pay teacher/consultant salaries and to purchase materials; administrative costs are absorbed in the existing DWI program. After two years of operation, about 250 young people have received alcoholism education with 85% referred for further treatment. A recent grant from the Maryland Dept. of Transportation will allow a formal evaluation of the program.

by Phyllis Baron; Wendall Turner
Prince George's County Health Dept., Md.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p357-64
1979
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Availability: In HS-804 857

HS-027 614

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)

ADAPTS (Alcohol - Drivers and People - Teaching Safety), a nine-week minicourse designed for sophomores as a preliminary or concurrent class to the regular driver education classes at Newfound Memorial High School in Bristol, New Hampshire, is described. The course is designed to educate students about the abuse of alcohol and other drugs in terms of driving and social situations and to promote responsible behavior. The project was initiated two years ago with funding from the N. H. Hwy. Safety Agency. The course is activity-oriented and prevention-based. Among other objectives, it promotes understanding of self, responsible decision making, positive alternatives to alcohol and other drugs, and the reduced acceptance of inappropriate behavior. First-year evaluations on partial statistical information show positive gains through the project; further development and refinement are in process.

by Peter J. Shanelaris; Timothy R. Mahurin
Newfound Memorial High School, Bristol, N.H.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p365-9
1979
Conference held in Washington, D.C., 30 Apr-2 May 1979.
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HS-027 615

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS

The Cumberland Farm Chemical Dependency Program (Richmond, Virginia), providing alcohol and drug abuse education and counseling to young people, is described. The program is designed to intervene in developing drug or alcohol problems. An attempt is made to afford the client a climate characterized by successful experiences and positive outlook and to acquaint the individual with his own resources and potential to discover new ways of coping with internal or environmental stresses. Focus is placed on the development of a creative approach to living and the whole-person approach is incorporated as the basis for emphasis on self-actualization. Using a multidisciplinary team approach, the following educational and counseling services are provided: evaluation, phase 1/group workshop, phase 2/structured group interaction, phase 3/group counseling, phase 4/after care/continued group therapy, individual counseling, family counseling, concerned parents group, children of alcoholics/peer group counseling, referral to supportive services, and follow-up. Any young person under the age of 25 who is a resident of the Richmond metropolitan area, who is experiencing negative consequences in his life as a result of drug or alcohol use is eligible. The nonprofit organization offers services on a sliding fee scale, based on family income.

by George Bright
Cumberland Farm for Adolescents, Richmond, Va.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p371-5
1979
Conference held in Washington, D.C., 30 Apr-2 May 1979. See also HS-027 616.
Availability: In HS-804 857

HS-027 616

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA

The problem of alcohol and driving is reviewed with special reference to youth. Alcohol consumption increases the probability of crash involvement more among teenagers than among other age groups because teenagers are just learning to drive, just learning how to operate an automobile after drinking, and are doing a great deal of night driving. Youth and young adults account for a disproportionate share of both fatal and nonfatal accidents in the U.S. The ASAP (Alcohol Safety Action Project) approach is reviewed, and suggestions for its adaptation to serve the special circumstances of young drivers proposed. The ASAP approach recognizes that complicated social problems must be addressed in a comprehensive manner (enforcement, judicial, rehabilitation and treatment, evaluation, and public information and education activities). Because the lifestyle, life experiences, and value systems of youth differ markedly from those of adults, it is unwise to mix youthful and adult defendents in alcohol-related education and treatment modalities. To be effective, ASAP-Sponsored youth programs must look beyond the individual offender, addressing influences by the peer culture, the school, and the families of youth. The Richmond ASAP is described, as well as a special pilot effort developed to deal with drunk driving among youth and young adults. The Cumberland Farms, Inc. special outpatient treatment facility for youth and young adults was established in July 1978 through Richmond ASAP funds. An important feature of this program is parent involvement. A discussion is presented on the prevention of alcohol misuse by pre-driving youth, and the Richmond ASAP imitation of a clearly identified prevention program for youth who have not yet started to drive or who are just receiving their learner's permits.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p377-99
1979 ; 33refs
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Availability: In HS-804 857

HS-027 617

THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)

The special class for the illiterate individual, established in 1972 by the DWI (driving while intoxicated) Counterattack Program in Tampa, Florida, is described. The class was structured to combat the failure experienced by the illiterate person in the regular classes of the program, which require a significant amount of reading and writing. The special program was devised to emphasize active participation, and designed to teach each student at his level of comprehension. The class is divided into four sessions with three instructors present at all times; a high student-teacher ratio was established so that each student could receive a great deal of individual attention. The first session involves exercises to allow students to experience changes in depth perception, visual field, and double vision without drinking. The second session confronts myths regarding alcohol use. Specialized drink charts are filled out by students in small groups, and reviewed with each student. The latter part of the second session is used to assign students to small groups and to assist each student in filling out a questionnare to help the student analyze his drinking problem. The third session begins with a group discussion on problem drinking, and charts are discussed in such a way that each student has an opportunity to view himself in a particular graphical representation (based on questionnaire responses). The last session reviews all materials presented, and an oral knowledge test is administered in which each student is called on randomly to answer a question. Former students of the DWI program give presentations, and films are shown during each session.

by J. Daniel Faulkner; James G. Johnston; Mike J. Painters; Gerald T. Wili
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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p401-17
1979 ; 6refs
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HS-027 618

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY

The background and structure are described of the New Jersey Div. of Motor Vehicles, Bureau of Alcohol Countermeasures (BAC), a program mandated by state law which applies to all drivers convicted of alcohol-related traffic offenses. The BAC is the focal point of a coordinated effort within the state to reduce the incidence of drunk driving and its harmful consequences through education or rehabilitation of convicted drinking drivers, increased law enforcement, improved administration of the law, and the education of the driving population in general to a safe and reasonable standard of drinking before driving. This program is unique in the U.S. because of its mandatory nature, its low cost, its relative simplicity in design, and its pivotal location in state government. BAC was preceded by a Federally (402) funded pilot program, the Alcohol Countermeasures Project which ran from May 1972 until Apr 1977 in four counties. The BAC components are similar to those used in the Alcohol Safety Action Projects, but the BAC approach is novel in the assignment of clients to appropriate programs, in reliance on a brief education component, and in the use of community resources. The screening attempts to divide all driving while under the influence offenders into two categories for referral purposes: persons who require some kind of structured treatment for an alcohol problem, and persons who do not require such treatment but who are capable of controlling their alcohol intake when motivated. Since program inception, 25% of all referrals have been to treatment programs and Alcoholics Anonymous; roughly 75% of those referred attend the education component called the Alcohol Safety Inst. Recidivism from all BAC components is currently less than 3%.

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1979 ; 3refs
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HS-027 619

A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT

A proposed pretrial intervention (diversion) project for the treatment of drinking drivers is depicted. The project plans to defer the prosecution of the cases while an evaluation is made to determine whether the resources of the community would be more beneficial than the court sanction. The proposed approach is to use the Community Resources Management Team (C.R.M.T.) concept, under which the probation counselor/officer will share his case load with a team of six officers. The counselor will develop a comprehensive file of community resources related to his area of expertise. The team concept frees the counselor to establish relationships with other agencies and to determine what type of client will benefit from the available services. The C.R.M.T. will consist of a senior officer, two clerks, three junior officers, and two paraprofessionals. The team will supervise a case load of approximately 400 clients. One of the officers will specialize in mental health, one in alcohol abuse, and the third in employment, education, and vocational training. The senior officer will be responsible for group correlation. The paraprofessionals will be responsible for the supervision of the paperwork cases, estimated at 45%. The total pretrial intervention project should consist of the diagnostic and screening section, data control section, restitution section, violation section, C.R.M.T., and group therapy. The project brings together those agencies which ordinarily operate separately to act as a combined force, developing avenues to accomplish objectives beneficial to the community and the clientele.

by Catherine Walton
City Court Probation and Diversion, Memphis, Tenn.
Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p431-41
1979
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HS-027 620

THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM

The background, operation, and evaluation are described of the New York State Alcohol and Drug Rehabilitation Program, commonly referred to as the Drinking Driver Program (DDP). The DDP, fully operational since 1 Oct 1975, was developed by incorporating the most successful approaches to dealing with the drinking driver evidenced in Alcohol Safety Action Project efforts and in experimental programs conducted in New York State. The principal objectives of the program are to reduce alcohol-related (A/R) accidents and incidents, to offer alcohol rehabilitation services, and to stimulate prosecution of A/R driving charges. By design, the DDP allows about 95% of all motorists convicted of A/R charges to enter a program of education and rehabilitation. While participation in the program is voluntary, courts have been encouraged to conditionally discharge motorists into the program. In essence, the motorist is not imprisoned and generally not fined or put on probation, under the condition that he attend and satisfactorily complete the DDP. The program consists of a 16-hour, seven-session course of learning and discussion, which addresses drinking and driving behavior and its impact on the traffic system as a whole, and includes self-analysis of drinking behavior. Some motorists are referred to professional counselors and rehabilitative programs if during the classroom phase, the instructor determines that a motorist may be in need of alcoholism treatment. All costs of the program are borne by the participant. Evaluation studies have shown that a group of DDP drivers had a significantly higher rate of conviction during the 18 months prior to program participation than a total driver population group during a concurrent period, but had a significantly lower conviction rate in the 18 months subsequent to DDP participation. Although both groups had a statistically significant reduction in accidents from the one period to the other, the DDP group still had a post-treatment accident rate twice as high as the driver population sample.

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Publ: HS-804 857, "NCA Alcohol and Traffic Safety Session (1979) Proceedings," Washington, D.C., 1979 p443-66
1979
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HS-803 609

THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT

Two experiments were designed to investigate the effects o alcohol on driver decision making as opposed to driver contro capability. A laboratory study was made involving a complex interactive driver simulator, followed by a field validation experiment employing an instrumented car and interactive tes course which duplicated many driving simulator tasks and conditions. The research was designed to determine whether alcohol affects the driver's willingness to accept risk, or whethe alcohol merely deteriorates his perceptual and psychomoto properties, leading to unavoidable increases in risk taking tha cannot be compensated for. The results of the two experiment are quite consistent. Risk taking increased in a dose-respons relationship with blood alcohol concentration as measured i increased accidents and traffic tickets, and the accident result are consistent with real-world epidemiological data. Decisior making analysis indicated that the increased risk taking wa caused by degraded perceptual and psychomotor capabilities, not increased acceptance of risk.

by R. Wade Allen; Stephen H. Schwartz; Jeffrey R. Hogge; Anthony C. Stein
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
DOT-HS-4-00999
Rept. No. STI-TR-1053-1; PB-288 811 ; 1978 ; 96p 44refs
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Availability: NTIS

HS-803 658

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT

At ten regional workshops on bicycle safety, Feb-Apr 1978, 439 bicycle safety professionals met to discuss ongoing projects, problems, ideas, and recommendations for improvements. The workshops were sponsored by the National Hwy. Traffic Safety Administration and the Consumer Product Safety Commission. Abridged staff presentations (by Urban Scientific and Educational Res, Inc.) cover the following areas: background, comprehensive safety program planning, six major accident groups, education concepts, implementation theory, program cost, facilities concepts, and evaluation. A state of the art of bicycle safety is formulated based upon the common programs in the U.S., and comment is given on rare and innovative programs. Recommendations to Federal, state, and local governments are presented, with brief descriptions of the intent and rationale for each. Appended are an index of workshop materials, and a participant list with short bicycle interest biographies as submitted. Education programs were widely criticized; evaluation of old and development of new approaches were recommended. It was suggested that bicyclist behavior may change positively after enforcement, and that enforcement requires more effort than is now exerted. Evaluation of facilities projects for safety impact was advocated as a means to assist in developing a methodology for prioritizing facilities projects. It was found that facilities were generally directed only at the overtaking accident; cost considerations suggest this approach will not make a substantial impact on bicycle safety. New facilities approaches to reduce bicycle/motor vehicle conflict at intersections were recommended. Effective cycling or on-the-road bicycle education received considerable attention, and demonstration programs, with evaluation and cost-effectiveness analysis, were recommended.

by Vincent Stephen Darago
Urban Scientific and Educational Res., Inc., P.O. Box 19112, 20th St. Station, Washington, D.C. 20036
DOT-HS-7-01798
1978 ; 202p refs
Rep. for 28 Sep 1977-15 Sep 1978.
Availability: NTIS

HS-803 720

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT

A preliminary analysis is provided of U.S. automobile manufacturers' probable responses, and of issues bearing on their decision making for meeting average fuel economy standards for the 1981 through 1985 model year passenger automobiles. Alternative schedules for fuel economy standards are considered. Manufacturers' options, both technological and nontechnological, are discussed for meeting the standards. Exogenous factors that bear on standards implementation (national economic climate, energy policy and conservation, factors bearing on costs of ownership and operation, and those bearing on transportation and travel demand) are examined. The likely overall strategy of the automakers in compliance efforts, and the probable strategies of the individual companies (American Motors Corp., Chrysler Corp., Ford Motor Co., and General Motors Corp.) are discussed.

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TS-13750
Rept. No. DOT-TSC-NHTSA-78-42 ; 1979 ; 67p refs
Rept. for Apr-Sep 1977.
Availability: NTIS

HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1

A baseline test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 1, run at 25 mph at a striking angle of 60 degrees, involved a 1975 Ford Torino as the bullet vehicle and a 1976 Plymouth Volare as the target vehicle. Presented are a crash test summary, before and after photographs, lists of camera locations and intrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

by E. Enserink
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 56p
Rept. for June 1976-Mar 1978. Cover date is 1979. See also HS-803 781, HS-803 782, HS-803 784--HS-803 787, and HS-803 789.
Availability: NTIS

HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT

A test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 3, run at 25 mph at a striking angle of 60 degrees, involved a 1975 Ford Torino as the bullet vehicle and a modified 1976 Plymouth Volare as the target vehicle. Volare modifications included a heavier door beam, stronger beam-to-door connections, and tabs for locking the door structure into the sill. The modified vehicle showed significant improvement in intrustion and door velocity compared to baseline tests. Presented are a crash test summary, before and after photographs, lists of camera locations and intrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

by E. Enserink
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 58p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 782, HS-803 784--HS-803 787, and HS-803 789.
Availability: NTIS

HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT

A test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 4, run at 35 mph at a striking angle of 90 degrees, involved a 1975 Ford Torino as the bullet vehicle and a modified 1976 Plymouth Volare as the target vehicle. Volare modifications included a heavier door beam, stronger beam-to-door connections, and tabs for locking the door structure into the sill. The modified vehicle showed significant improvement in intrusion and door velocity compared to baseline tests. Presented are a crash test summary, before and after photographs, lists of camera locations and intrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

by E. Enserink
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 62p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 781, HS-803 784--HS-803 787, and HS-803 789.
Availability: NTIS

HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT

A test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 6, run at 35 mph at a striking angle of 60 degrees involved a 1975 Ford Torino as the bullet vehicle and a modified 1976 Plymouth Volare as the target vehicle. Volare modifications included a heavier door beam, stronger beam-to-door connections, and tabs for locking the door structure into the sill. The modified vehicle showed significant improvement in intrusion and door velocity compared to baseline tests. Presented are a crash test summary, before and after photographs, lists of camera locations and intrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

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Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 64p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 781, HS-803 782, HS-803 785--HS-803 787, and HS-803 789.
Availability: NTIS

HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT

A test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 7, run at 35 mph at a striking angle of 60 degrees, involved a 1975 Ford Torino as the bullet vehicle and a modified 1976 Plymouth Volare as the target vehicle. Volare modifications included a heavier door beam, stronger beam-to-door connections, and tabs for locking door structure into the sill. The modified vehicle showed significant improvement in intrusion and door velocity compared to baseline tests. Presented are a crash test summary, before and after photographs, lists of camera locations and intrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

by E. Enserink
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 63p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 781, HS-803 782, HS-803 784, HS-803 786, HS-803 787, and HS-803 789.
Availability: NTIS

HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT

A test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 8, run at 35 mph at a striking angle of 90 degrees, involved a 1975 Ford Torino as the bullet vehicle and a modified 1976 Plymouth Volare as the target vehicle. Volare modifications included a heavier door beam, stronger beam-to-door connections, and tabs for locking the door structure into the sill. The modified vehicle showed significant improvement in intrusion and door velocity compared to baseline tests. Presented are a crash test summary, before and after photographs, lists of camera locations and intrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

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Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 66p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 781, HS-803 782, HS-803 784, HS-803 785, HS-803 787, and HS-803 789.
Availability: NTIS

HS-803 787

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT

A baseline test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 9, run at 35 mph at a striking angle of 90 degrees, involved a 1975 Ford Torino as the bullet vehicle and a 1976 Plymouth Volare as the target vehicle. Presented are a crash test summary, before and after photographs, lists of camera locations and instrusion measurement locations, interior and exterior damage measurements, instrumentation locations, dummy positions and injury criteria values, and electronic data in plotted form.

by E. Enserink
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1977 ; 58p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 781, HS-803 782, HS-803 784--HS-803 786, and HS-803 789.
Availability: NTIS

HS-803 789

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT

A test was conducted as part of an 11 crash and 1 crush test program to evaluate the improvement in side impact crashworthiness of a compact automobile incorporating improved front door structural characteristics. Test No. 11, run at 35 mph at a striking angle of 90 degrees, involved a 1978 Chevrolet Impala as the bullet vehicle and a modified 1976 Plymouth Volare as the target vehicle. Volare modifications included a heavier door beam, stronger beam-to-door connections, and tabs for locking the door structure into the sill. The modified vehicle showed significant improvement in intrusion and door velocity as compared to baseline tests. Presented are a crash test summary, before and after photographs, lists of camera locations, and intrusion measurement locations, dummy positions and injury criteria values, and electronic data in plotted form.

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Dynamic Science, Inc. 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-5-01104
1978 ; 90p
Rept. for Jun 1976-Mar 1978. Cover date is 1979. See also HS-803 779, HS-803 781, HS-803 782, and HS-803 784--HS-803 787.
Availability: NTIS

HS-803 819

CHILD RESTRAINTS. ISSUE PAPER

The issue of child restraints is addressed, and the National Hwy. Traffic Safety Administration's position on state laws regarding this issue is presented. States are encouraged to enact legislation to require special protection for young children. Since the special vulnerability of young children can be reduced only by responsible adult action, each state is encouraged to enact legislation that will adopt the Dept. of Transportation's performance standard (Federal Motor Vehicle Safety Standard 213) for child passenger protective devices, encourage proper conformance to manufacturers' instruction on proper usage, and require the use of such devices for child passengers in a motor vehicle. Copies of an article by Kenneth W. Heathington on the first six months of Tennessee's child restraint law, from Traffic Safety (Nov 1978), and of child restraint legislation enacted in Washington State are provided.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 17p
Availability: NHTSA

HS-803 820

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER

The issue of the Nonresident Violator Compact (NVC) of 1977 is addressed, and the National Hwy. Traffic Safety Administration's position on state NVC adoption is presented. The NVC should be adopted by all states for several reasons. Police are able to devote more time to highway patrol, surveillance, and apprehension since they are not burdened with violator processing procedures. Court revenues are increased since nonresidents cannot ignore a party state's citation without facing a driver license penalty at home. The number of "failure-to-appear" cases has decreased in those states where the NVC has been adopted. Motorists' delay and/or inconvenience is comparable for resident and nonresident violators. Copies of model enabling legislation and model compact are provided.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 12p
Availability: NHTSA

HS-803 821

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER

The issue of the use of 55 mph maximum speed limit radar detection devices by motorists is addressed, and the National Hwy. Traffic Safety Administration's position on state laws regarding this issue is presented. The only purpose for a radar detection device is to avoid apprehension for violating the speed limit, and law enforcement agencies strongly oppose the manufacture, sale, possession, and use of these devices. State enforcement agencies should make individual analyses of the extent to which radar detectors adversely influence speed limit compliance or enforcement tactics and costs in the state, and, on the basis of these analyses should recommend appropriate state legislative action, including the enactment of statutes prohibiting their possession and/or use by motorists. Truck and bus companies should also prohibit the use of radar detectors by their drivers. Copies are provided of Section 46.1-198.1, Code of

Virginia; Connecticut regulation of the Commissioner of Motor Vehicles, Section 14-1-137; and Article 25, Section 16 of the District of Columbia police regulations, all prohibiting the use of radar detection devices.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 8p
Availability: NHTSA

HS-803 823

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER

The issue of illegal per se and preliminary breath testing laws is addressed, and the National Hwy. Traffic Safety Administration's position on these laws is presented. States should be encouraged to adopt the preliminary breath test and illegal per se laws since they increase the number of drinking driver arrests and the conviction rates for arrests. The increased scientific/research support for the breath alcohol test as an objective measurement of driver impairment, and the rapid improvement in breath alcohol measurement technology and chemical testing programs have made possible the adoption of these laws. Copies of a Uniform Vehicle Code (UVC) model law (illegal per se) and a preliminary breath test-implied consent model law (which would amend UVC Section 6-205.1) are provided.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 7p
Availability: NHTSA

HS-803 824

GENERAL SAFETY BELT USAGE. ISSUE PAPER

The issue of general safety belt usage is addressed, and the National Hwy. Traffic Safety Administration's position on state laws regarding this issue is presented. Necessary factors in mandatory seat belt usage legislation include a monetary penalty for noncompliance, continuous enforcement carried out whenever a police officer stops a motorist for another violation, and a public information program concerning the benefits of using safety belts. States are encouraged to enact legislation that will require the use of safety belts provided the effective date of the law is established so as to permit: adequate time to develope public awareness, understanding, and voluntary compliance; and the orientation and training of the personnel responsible for implementation. Tabulated information is presented on the effect of safety belt usage laws worldwide. A copy of a model safety belt use law is provided.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 12p
Availability: NHTSA

HS-803 825

URBAN PEDESTRIAN SAFETY. ISSUE PAPER

The National Hwy. Traffic Safety Administration's position on state laws regarding the issue of urban pedestrian safety is presented. Efforts must be made to improve the uniformity of state pedestrian laws. City, county, and state authorities must be able to identify their specific pedestrian problems and plan programs to impact them. Pedestrian accident data must provide a reasonably accurate assessment of the relative magnitude of the pedestrian accident types. The state and local traffic record system should be based on data provided through accident investigation and reporting. To facilitate these programs, a single state agency should have primary administrative authority and responsibility for pedestrian safety. The state and its political divisions should establish policies and directives that bring about countermeasure activity on a multidisciplinary basis. The laws and ordinances should be in reasonable conformity with appropriate chapters and sections of the Uniform Vehicle Code (UVC) and Model Traffic Ordinance, with flexibility allowed for the adoption of laws outside the UVC which will enhance pedestrian safety. Copies of two model pedestrian ordiances (Bus Stop and Ice Cream Truck) are provided. Seven of the 30 specific pedestrian accident types are listed; these seven types account for about 60% of all urban pedestrian accidents: dartout, intersection dash, vehicle turn/merge (attention conflict), multiple threat, bus stop related, ice cream vendor truck, and backing.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 9p
Availability: NHTSA

HS-803 856

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT

The key thought processes are outlined that are used by the drivetrain designer in matching an engine to a given vehicle with specific performance goals in mind. For those uninitiated in this aspect of automotive design, valuable insight is provided into the compromises that must be made among acceleration, gradeability, and top speed. Also presented is a method by which the performance of any modern torque converter may be approximated with accuracy, when only the stall torque ratio and diameter are known. These two parameters can be used to generate torque converter maps that almost duplicate actual maps for torque converters of any modern manufacturer, and greatly facilitate computer simulation.

by D. A. Hurter; P. G. Gott
Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140
DOT/TSC-1046
Rept. No. DOT-TSC-NHTSA-79-11.II ; 1979 ; 81p refs
Rept. for Jun 1975-Dec 1976. Vol. 1 is HS-803 855.
Availability: NTIS

HS-803 911

SEAT BELTS: 1949-1956. FINAL REPORT.

The history of seat belt use is reviewed for the period 1949-1956. The aircraft industry was responsible for the development of seat belts and much of the early research relating to injury, deaths, and accidents. Early advocates of belts included safety researchers, engineers, and doctors. In 1955, there were a number of barriers to the adoption of belts, including poor design, high cost, installation problems, the lack of a sales effort or consumer information campaign, and the lack of a consistent set of standards, as well as misconceptions held by many consumers. By 1955, seat belts were at the center of a hotly contested behind-the-scenes controversy over safety in the automobile industry. In this struggle, Ford played the role of a strong advocate for safety and seat belts; GM was an adversary. Ford undertook a program, the "Safety Campaign," in order to sell various safety features on its 1956 models. The campaign was short-lived, the industry claiming that safety did not sell. However, there is much to suggest from Ford's experience that safety does indeed sell. Ford's reversal on the safety program set back the seat belt movement for a number of years, and may be partly responsible for bringing about government regulation of the industry.

by Larry Ronan
Lexington Technology Associates, 10 Wingate Rd., Lexington, Mass. 02173
DOT-TSC-1355
Rept. No. DOT-TSC-NHTSA-79-1 ; 1979 ; 54p refs
Rept. for Apr 1978-Dec 1978.
Availability: NTIS

HS-804 009

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT

Technology was developed for determining delta-9-tetra hydrocannabinol (I) and its major metabolite 11-nor-delta-9-tetrahydro- -cannabinol-9-carboxylic acid (II) in human blood plasma utilizing high pressure liquid chromatography-ultraviolet detection. The methods were found to be capable of determining 10 ng (nanograms) of I or II in one ml of human plasma. A third type of assay method was developed for identifying in human saliva one of the major constituents of marijuana, cannabinol (III). Results indicated that III photolytically converted to a highly fluorescent compound in the absence of air. Using this technique, a limited study of marijuana smoker's saliva and saliva from non-marijuana smokers to which I and III had been added was conducted. This study demonstrated that 1 ng/ml of III can be detected in saliva.

by J. L. Valentine; P. J. Bryant; P. L. Gutshall; O. H. M. Gan; B. H. C. Niu; P. Psaltis
University of Missouri-Kansas City, 2411 Holmes St., Kansas City, Mo. 64108
DOT-HS-4-00968
1977 ; 51p 10refs
Rept. for 28 Jun 1975-28 Jun 1976. Cover date is 1979.
Supported in part by the National Inst. on Drug Abuse.
Availability: NTIS

HS-804 094

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT

by Roy S. Rice; David J. Segal; Ian S. Jones
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-6-01382
Rept. No. ZQ-5993-V-1 ; 1978 ; 26p
Rept. for 30 Jun 1976-30 Jun 1978. For abstract, see Vol. 1, HS-804 093.
Availability: NTIS

HS-804 105

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT

In order to provide a practical means for developing and monitoring standards of driver visibility quality, an electro-optical modulation transfer function (MTF) meter was designed and delivered to the National Hwy. Traffic Safety Administration. Tests were conducted with Landolt ring targets to relate human vision to meter readings, under various types of optical degradation (windshield fogging, icing, dirt film, etc.); there was excellent agreement between meter readings and visual test measures, confirming that the visibility quality meter (VQM) can determine whether visibility quality meets minimum requirements. The VQM is a rugged and simple solid-state device with an oscilloscope display of image luminance cross-section; image contrast values are read directly from the display for determination of MTF (i.e. contrast transmittance). The large body of visual contrast-sensitivity data available in the literature can be directly related to VQM readings, thus providing visibility standards for targets of a given size, shape, distance, luminance, and viewing condition. Further research with driving-specific visual tasks is required to directly link the VQM and driver visibility requirements. Significant findings include: a relatively simple optical meter can be used for in-vehicle measurement of contrast degradation and optical distortion; since the MTF's in question are decreasing monotonic functions of spatial frequency, it is sufficient to test at just one spatial frequency representing finer detail to ensure adequate visibility for all detail larger than the test frequency; driver visibility is limited more often by contrast degradation than by inadequate resolution, since many of the driver's visual tasks involve relatively very large objects; the MTF for veiling luminance is equal at all frequencies, permitting very simple measurement.

by John O. Merritt; Robert E. Newton; Glenn A. Sanderson; Merlyn L. Seltzer
Human Factors Res. Inc., 6780 Cortona Drive, Goleta, Calif. 93017
DOT-HS-6-01426
Rept. No. 1780-1 ; 1978 ; 163p 41refs
Rept. for Jun 1976-Apr 1978.
Availability: NTIS

HS-804 127

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT

Of the three objectives of the program, the most important was to implement and critique the methodology for evaluating periodic motor vehicle inspection (PMVI) programs developed under Contract DOT-HS-5-01159. Full-scale administrative and field evaluations of PMVI programs in Virginia and New Hampshire were made, involving passenger cars only. A second objective was to perform field evaluations of brake component condition, comparing brake condition in states with and without wheel pull requirements. A total of 3533 vehicles was inspected in Virginia and New Hampshire (wheel pull), and Maine and Maryland (no wheel pull). The availability and condition of seat belts were analyzed in 3100 of the vehicles inspected. A third objective was to design an experiment for direct measurement of the impact of PMVI on overall vehicle condition. Alternative designs for such an experiment are discussed, including controlled experiment, non-equivalent control group, before/after, and interrupted or multiple time series. The last mentioned design is recommended.

by James A. Milne; Charles R. Cantwell; William Meroney
Chilton Co., 1 Chilton Way, Radnor, Pa. 19089
DOT-HS-7-01544
1978 ; 233p refs
Rept. for Mar 1977-Aug 1978.
Availability: NTIS

HS-804 190

MOTORCYCLE HANDLING. VOL. 1: SUMMARY REPORT. FINAL REPORT

by David H. Weir; John W. Zellner
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
DOT-HS-6-01381
Rept. No. STI-TR-1086-1-I ; 1978 ; 46p 15refs
Rept. for Aug 1976-Feb 1978. For abstract, see Vol. 2, HS-804 191.
Availability: NTIS

HS-804 191

MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT

Analytical and experimental studies of the handling response and performance of motorcycles are reported. Five instrumented example vehicles were used. Steady turn, single lane change, cornering and braking, and cornering and accelerating tests were accomplished. Test procedures and measures are presented, together with subjective evaluations. Oscillatory behavior involving weave and wobble motions was investigated. The effects of adding load, changing operating conditions; and modifying vehicle configuration are shown. Braking tests were made with a motorcycle fitted with a prototype antilock brake system, and the results show markedly superior performance on wet (low skid number) surfaces. Linear and nonlinear digital computer simulations of motorcycle response and performance are described and demonstrated.

by David H. Weir; John W. Zellner; Gary L. Teper
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DOT-HS-6-01381
Rept. No. STI-TR-1086-1-II ; 1978 ; 526p 44refs
Rept. for Aug 1976-Feb 1978. Vol. 1, Summary Report, is HS-804 190.
Availability: NTIS

HS-804 192

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT

Full-scale braking tests are reported for a Norton 850 motorcycle fitted with a prototype antilock brake system on the front and rear wheels. The system was designed by Mullard, Ltd. (U.K.) and has undergone development and demonstration work at the Transport and Road Res. Lab., Crowthorne, England. The tests included straight-line braking and braking in a turn, on both dry and wet surfaces. Various braking methods were used in addition to the antilock system, including open-loop (with brake force limiters) and closed-loop control by an expert test rider. On low-coefficient wet surfaces, the antilock system gave braking performance which was significantly better than that which could be achieved by either an expert rider or suitably-tuned, open-loop braking procedures. A description of the motorcycle data acquisition system is appended.

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DOT-HS-6-01381
Rept. No. STI-TR-1086-2 ; 1978 ; 44p 3refs
Rept. for Aug 1976-Feb 1978. Cover date is 1979.
Availability: NTIS

HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT

Work is described which involved refinement and expansion of the Driver-Vehicle Effectiveness Model (DRIVEM) and implementation of model software on a computer facility designated by the National Hwy. Traffic Safety Administration (NHTSA). DRIVEM is a Monte Carlo simulation model intended for use by NHTSA to evaluate alternative vehicle subsystems or effects of legislative actions proposed to reduce the probability and severity of highway traffic accidents. Candidate DRIVEM applications were structured around Federal Motor Vehicle Safety Standards (FMVSS) requirements, in particular the 100 series (pre-crash) standards. Based on FMVSS review and discussions with NHTSA, candidate areas of application selected were displays and controls, rearview mirrors, windshield clearing system and pillar design, vehicle exterior lighting, reflecting surfaces, service brakes, tires and rims, and steering and suspension. Eleven scenarios representing potential accident situations to be simulated were developed based on a review of accident literature, and the relevance of these situations to DRIVEM applications was evaluated. Work on the model development task was concentrated in component areas of driver modeling and vehicle modeling. The DRIVEM digital program was implemented in FORTRAN and demonstrated in a sample application to illustrate user procedures. Recommended areas for further work to improve and verify the predictive capability of DRIVEM and its utility to NHTSA are model applications experience, expert review and critique, and validation studies.

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DOT-HS-6-01319
Rept. No. 78SRC113 ; 1978 ; 184p 40refs
Rept. for Mar 1976-Aug 1978. Vol. 2, Appendices, is HS-804 338.
Availability: NTIS

HS-804 338

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT

Detailed flow charts and FORTRAN program listings of the main program and subprograms for the Driver-Vehicle Effectiveness Model (DRIVEM) are provided. Sample input and output of a representative application of the DRIVEM simulation are presented; the scenario simulated is the subject vehicle (driver-vehicle system) following in the presence of oncoming traffic under nighttime conditions with a decelerating vehicle directly ahead. Detailed equations are presented for each of four vehicle models (6-, 3-, 2-, or 1-degree of freedom). Probability expressions from corresponding logical expressions for a maneuver decision model are derived, as well as probabilities of adjacent vehicles occupying each of various safe-maneuvering regions. Nominal values for DRIVEM parameters and variables are given, as well as the basis for the nominal data. DRIVEM is a Monte Carlo simulation model intended for use by the National Hwy. Traffic Safety Administration to evaluate alternative vehicle subsystems or effects of legislative actions proposed to reduce the probability and severity of highway traffic accidents.

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DOT-HS-6-01319
Rept. No. 78SRC114 ; 1978 ; 226p 37refs
Rept. for Mar 1976-Aug 1978. Vol. 1, Final Report, is HS-804 337.
Availability: NTIS

HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT

by John S. Howland
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DOT-HS-7-01723
Rept. No. C-81215-Vol-1 ; 1978 ; 23p
Rept. for Oct 1977-Dec 1978. For abstract, see Vol. 2, HS-804 340.
Availability: NTIS

HS-804 340

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT

A vehicle theft survey was conducted, consisting of a literature search and interviews with a wide range of experts including law enforcement officials, insurance personnel, automobile manufacturers, and automobile thieves. The data, which include up-to-date statistics on theft rates, motives, methods, and costs, were analyzed to identify and rank the most important criteria for anti-theft systems. Based on these criteria, a conceptual design study was conducted to identify anti-theft system concepts. From several promising system concepts, a remote steering lock coded by means of a keyboard in the passenger compartment was selected as optimum for a test system. The system was fabricated and installed in a test vehicle. Prior to the installation of the improved system, the factory-equipped, locked vehicle was mobilized by an amateur test subject in 50 seconds. The improved system resisted the efforts of a retired professional auto thief who gave up the effort after nearly 17 minutes (the design goal being 10 minutes). The ultimate consumer price increase to cover the system is estimated to be between $17 and $36, a range well below the design goal of $50 (based on expected average savings in theft costs over the life of the vehicle). As a result of the survey and the design program, a modified safety standard based on minimum time-to-defeat is recommended as the most straightforward and least design-restrictive approach. An alternative, based on limited accessibility of the vulnerable components, is also recommended if subjective compliance testing must be avoided, although this alternative is inherently more design-restrictive.

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DOT-HS-7-01723
Rept. No. C-81215-Vol-2 ; 1978 ; 154p refs
Rept. for Oct 1977-Dec 1978. Vol. 1, summary report, is HS-804 339.
Availability: NTIS

HS-804 354

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT

Field measurements of noise were made near a railroad retarder system without barriers and with acoustical barriers of various configurations. The configurations tested included acoustically reflective and acoustically absorptive barriers with heights of 4 ft to 12 ft and lengths extending from 0 ft to 22 ft beyond retarder entrance and exit. Two of the 12 ft high barriers were also tested with 1 ft inward projecting acoustical panel lip along the top. It was found that the absorptive barriers reduced retarder noise from a few decibels inside the barriers to as much as 25 dB at 100 ft from the retarder on the system centerline perpendicular to the tracks. Reflective barriers increased noise inside the barriers and at points outside, but near open ends, of the barriers; the reflective barrier noise reduction on the perpendicular centerline was limited to about 16 dB. Retarder noise was concentrated in a frequency range between 2 kHz and 3 kHz. It is concluded that to date no innovations, improvements or inventions have been made and that currently available schemes for predicting acoustical performance of a barrier do not yield accurate predictions for railroad retarder application.

by James A. Morgan; Uno Ingard
Burlington Northern, Inc., 176 East 5th St., St. Paul, Minn. 55101; Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, N.Y. 10462
DOT-TSC-1035
Rept. No. DOT-TSC-NHTSA-79-35 ; 1979 ; 93p 1ref
Rept. for Jun 1975-Feb 1977.
Availability: NTIS

HS-804 472

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979

This tabulation of safety defect recall campaigns of motor vehicles and equipment includes the National Hwy. Traffic Safety Administration identification number, date of company notification, make, model, model year, number of pages on file, number of vehicles recalled, and a brief description of defect and manufacturer's corrective action for each recalled product. Summary tabulations list number of recall campaigns and number of vehicles involved for domestic, foreign, equipment, and tire manufacturers reporting. The status of domestic and foreign campaigns completed as of 31 Mar 1979 is also tabulated. Among the vehicles involved in safety recall campaigns for this period are passenger cars, trailers (livestock, travel, camping), light, medium, and heavy duty trucks, motorhomes, transit coaches, motorcycles, mopeds, semi trailers, tank trailers, four-wheel-drive vehicles, and school buses. Equipment involved in recall campaigns includes tires, gasoline filters, bumper jacks, travel trailer doors, and telesopic hoists.

HS-804 548

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 43p
Availability: GPO

HS-804 548

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT

In conjunction with the National Accident Sampling System (NASS) which is being established by the National Hwy. Traffic Safety Administration to collect data on a nationally representative sample of accidents, there is a need for corresponding data on exposure to the risk of accident so that reliable accident rates can be determined. An effort was undertaken to design a National Exposure Data System (NEDS) and to plan a pilot test of this design. After extensive review of previous research studies and evaluation of the various design alternatives available, a number of features of the recommended design were established. The NEDS should involve a household interview survey in which selected drivers are asked to provide information about all driving trips made on one or more predesignated days, the location being in the same primary sampling areas used for the NASS. Not enough information was found in past studies to permit recommending the single, most cost-effective house hold data collection procedures. It is proposed that a pilot methodological study be carried out over 12 months to provide the essential data base for this decision. Evaluation criteria will include cost, completeness of trip reporting, response rates, coverage of the relevant population, accuracy of trip distance data, and completeness of reporting other trip variables.

by Arthur C. Wolfe
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-HS-7-01685
Rept. No. UM-HSRI-78-79 ; 1978 ; 107p 108refs
Rept. for Aug 1977-Sep 1978.
Availability: NTIS

HS-804 549

STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS

The state laws are reviewed on probationary licensing as they relate to all new licensees, especially to minors. Also examined are laws that affect minors but not as part of a probationary licensing scheme. The Uniform Vehicle Code and the relevant state laws are reviewed to ascertain the mechanisms by which probationary licensees and minors are identified, the restrictions on driving that are imposed, and the remedial actions that are administered. Twenty states place first-time licensees on probationary status (13 applying to minors and 7 to all original applicants). Although 31 states do not have probationary licensing laws, 16 states have laws affecting minors similar to probationary licensing. The most common age below which a probationary term is required is 18. Eleven states terminate the probationary period upon reaching the designated age, and nine states specify a set term. Six states have discretionary extension of the term based on driving record, and three will extend the period following license suspension or revocation. Probationary status is designated on drivers' licenses by color or design or use of profile rather than full-face photograph. Minors are similarly designated in some states. Two states restrict the driving time of probationary licensees to specific hours. Revocation of probationary licenses varies in terms of number of violations. Twenty-six states have laws relating to the licensing of minors in the areas of age identification, driving restrictions, and remedial action. Six states restrict driving time of minors not accompanied by an adult licensee. Special license withdrawal provisions for minors exist in ten states; only one state requires a minor's attendance at a driver improvement program.

by Stuart A. Liner
National Com. on Uniform Traffic Laws and Ordinances
DOT-HS-5-01121
Publ: Traffic Laws Commentary v8 n3 (May 1979)
1979 ; 26p refs
Availability: GPO, Stock no. 050-003-00354-9

HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT

Strategic issues involving eight domestic and foreign automotive manufacturers (American Motors Corp., Chrysler Corp., Ford Motor Co., General Motors Corp., Toyota Co., Nissan Motor Co., Honda Motor Co., and Volkswagen A.G.) are described and examined. The following three future scenarios involving a major regulatory program and an environmental counterforce are explored: the impact of a possible economic recession on automaker ability to comply with existing and possible future fuel economy standards, the impact of product liability trends on automaker ability to comply with existing restraint legislation (passive restraints as mandated by Federal Motor Vehicle Safety Standard 208), and emissions control standards and the impact of platinum group metals (catalyst) supply. A description of pricing in the automobile industry is presented and an examination made of the marketing practices of the automobile industry, including a description of the decision-making process in each automobile company. It is concluded that the regulatory process is likely to lead to an increasing concentration of market share by one or two of the largest companies. The cost impact of regulatory standards is likely to create annual price increases that will exceed rates of inflation or growth in consumer income. Efforts by the automakers to counter major consumer resistance to new vehicle types, price increases, or fuel-economy-related product mix goals of the American manufacturers may result in a shrinking of profit margins and internal investment flows. Even a minor recession in the next eight years is likely to destroy the abilities of Chrysler and American Motors to maintain their announced investment programs to meet existing regulations. The length of the product planning cycle has stretched to five or more years by the organic character of change required to meet regulations. A considerably higher frequency of product liability suits against automakers concerning passive restraints is very likely. It does not appear likely that technical or political problems will interfere with the ability of automakers to meet 1981 emission standards.

by John B. Schnapp; Patricia A. Comer; Donald F. Howard; Juergen Lange; J. Frank Remley; Cheryl R. Suchors; Jan-Hendrik Van Leeuwen
Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116
DOT-HS-7-01783
1978 ; 185p refs
Rept. for Oct 1977-Nov 1978. Vol. 2 is HS-804 586; Vol. 3 is HS-804 587.
Availability: NTIS

HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT

Strategic histories, beginning in 1945 and projected through 1985, are presented for eight domestic and foreign automotive manufacturers (American Motors Corp., Chrysler Corp., Ford Motor Co., General Motors Corp., Toyota Motor Co., Nissan Motor Co., Honda Motor Co., and Volkswagen A.G.). Each history is presented in three "episodes," usually 1945 to 1960 (VW, 1948-1968, 1969-1975), 1961 to 1975, and 1976 to 1985. The histories were developed from a wide variety of published sources. After drafts of the histories were completed, they were submitted to the company managements for review of factual accuracy. External influences, major strengths and weaknesses, assumed mission, assumed objectives, and strategies of each company are described for each time frame.

by John B. Schnapp; Patricia A. Comer; Donald F. Howard; Juergen Lange; J. Frank Remley; Cheryl R. Suchors; Jan-Hendrik Van Leeuwen
Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116
DOT-HS-7-01783
Rept. No. Rept. for Oct 1977-Nov 1978. Vol. 1 is HS-804 585; Vol. 3 is HS-804 587. ; 1978 ; 288p refs
Availability: NTIS

HS-804 587

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT

Some of the principal historical trends in the U.S. automotive industry are reviewed. Some basic factors about the operating economics of the auto industry are outlined to include the following: output capacity, relative capital intensiveness, the manufacturer-dealer relationship, collective bargaining, multinationalism, innovation and its relationship to research and development, capital structures, product life cycles, vertical integration and vendor relations, and miscellany. Primary demand for passenger cars is reviewed in terms of unit sales and market shares (1946-1977), key national economic indicators (1945-1977), passenger cars in operation (1946-1976), average age of passenger cars, and Consumer Price Index for new and used cars (1960-1977). Primary demand for light trucks is reviewed in terms of unit sales by class and market shares (1947-1977), and unit sales by body type (1966-1976) and market shares (1975-1976). An outline of corporate economics covers manufacturer financial data and management performance, and employment for the period 1945-1977. Marketing is reviewed in terms of new car dealership data, and media advertising expenditure for the period 1956-1977. Attached are an excerpt from the automotive industry section of a book on the structure of American industry, and articles in Fortune about consumer demand for pickups and vans, and a Ford dealership in Ohio.

by John B. Schnapp; Patricia A. Comer; Donald F. Howard; Juergen Lange; J. Frank Remley; Cheryl R. Suchors; Jan-Hendrik Van Leeuwen
Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116
DOT-HS-7-01783
1978 ; 75p refs
Rept. for Oct 1977-Nov 1978. Vol. 1 is HS-804 585; Vol. 2 is HS-804 586.
Availability: NTIS

HS-804 721

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.

The Driver Performance Measurement and Analysis System (DPMAS) was evaluated by using it to support the development and validation of a simplified model of automobile lateral dynamics. The DPMAS is a sophisticated instrumented vehicle developed by the National Hwy. Traffic Safety Administration for use in driver performance research. Equations describing free body motion of an automobile in inertial space are so complex as to be unusable in a practical sense. Even with simplifying assumptions to derive a set of quasilinear equations, a total of 46 parameters must be measured to define vehicle dynamics. A second order model has been developed which is useful providing the transfer function for the vehicle is known. In this study, a method was developed for estimating the transfer function coefficients for the second order model from data taken from the DPMAS. The model was shown to agree well with field data. Based on these results, it is concluded that a very simple measure, based on the damping ratio of the second order roots of the model, can be used as a measure of relative vehicle stability which is a function of both speed and lateral acceleration.

by F. J. Kern; K. R. Dunipace
University of Missouri-Rolla, Rolla, Mo.
DOT-HS-7-01533
1978 ; 86p 14refs
Rept. for Nov 1976-Sep 1977. For Summary Report, see HS-804 722.
Availability: NTIS

HS-804 723

OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)

A study was undertaken to develop a means for determining the optimum frequency for inspecting brake system components in order to minimize the probability of their being defective in the vehicle-in-use (VIU) population. The approach was to analyze the latest available brake inspection data and to use these results along with previously developed analytical techniques (Optimum Brake Inspection Plan, Contract No. DOT-HS-6-01383) to determine the optimum frequency of inspection. Data were collected and analyzed from a group of states participating in experimental wheel-removal brake inspection programs. Data from most of the participating states were not usable, but analysis of usable data from Florida, New Mexico, and Oklahoma revealed that the results were essentially the same as those obtained from an analysis of the Dept. of Transportation's VIU data base. The analysis also revealed that it was possible to merge the state data to update the VIU data base. The results of this study indicate that the Optimum Brake Inspection Plan developed for the earlier contract can likewise be utilized as a plan for specifying the optimum frequency of inspection for brake system components. The plan specifies inspecting brake fluid every six months on all cars, using brake tester on all cars in conjunction with the brake fluid level test, inspecting all front wheel brake components every six months beginning at a vehicle age of 18 months, and inspecting the front brake hose every six months beginning at vehicle age of three years. Recommendations for future study concern the use of the Criticality Index approach to designing optimum inspection programs.

by Franklin G. Fisher, Jr.; Randolph Eidemiller; Fran Oldham; Steven Pond
Ultrasystems, Inc., 2400 Michelson Drive, Irvine, Calif. 92715; Artec, Inc., St. Louis, Mo.
DOT-HS-7-01650
1978 ; 109p
Rept. for 15 Jun 1977-31 Dec 1978.
Availability: NTIS

HS-804 733

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT

This user manual is designed to aid the alcohol program administrator in his decisions concerning implementation of countermeasures to selected individuals or small groups of drivers. The manual shows how the predictor models developed as described in Vol. 1 can be used to predict the probability of a future alcohol-related crash for six high-risk groups of drivers (young males, 16-20 years old; males, 21-24 years old; persons recently divorced; persons recently released from prison; persons recently convicted of driving under the influence; and persons accumulating three or more traffic violations in a 5-year period). The user manual contains information on the inputs and outputs of the predictor models, information on the cost and effectiveness of potential countermeasure programs, and a method for conducting an economic analysis of a chosen countermeasure applied to a target group. Also presented is a brief overview of evaluation techniques and problems as they relate to trial alcohol countermeasure programs. Information concerning development of the predictor models, sample forms for use in the economic analysis, and a program listing for the computerized economic analysis are appended.

by Forrest M. Council; John H. Lacey; J. Richard Stewart
University of North Carolina, Hwy. Safety Res. Center, South Campus, CTP, 197A, Chapel Hill, N.C. 27514
DOT-HS-5-01250
1978 ; 150p refs
Rept. for Jun 1975-Jun 1978. Vol. 1 is HS-804 851.
Availability: NTIS

HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT

The feasibility was determined setting driver education program instructional objectives from existing accident data, and recommendations were made for appropriate National Hwy. Traffic Safety Administration action to define such instructional objectives. It was found that, although much accident data can be used to identify driver-oriented traffic safety problems, existing data are not adequate for setting comprehensive instructional objectives and priorities. A suitable dataset for these purposes would permit the identification of actions that drivers might have taken to prevent accidents, and would be nationally representative. The authors recommend a special study under the National Accident Sampling System as the appropriate means of collecting the desired data. Vol. 1 includes results of a literature review, a detailed definition of the information required to set instructional objectives, a review of existing data bases, a plan for collecting additional data, and a plan for incorporating new data and new instructional objectives into driver education programs. Appended supporting materials include a bibliography and sample reviews of existing multidisciplinary accident investigation cases.

by James A. McKnight; Rex D. Hume
Indiana Univ., Inst. for Res. in Public Safety, Bloomington, Ind. 47405
DOT-HS-7-01811
Rept. No. DOT-HS-7-01811-79(1); PB-298 116 ; 1979 ; 185p 45refs
Rept. for Oct 1977 - Feb 1979. Vol. 2, Identifying Accident Avoidance Behaviors: A Guide for Accident Investigations, is HS-804 747.
Availability: NTIS

HS-804 747

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT

A manual of procedures is provided for investigating accidents in order to identify accident-avoidance behaviors. After these behaviors have been identified, they will be analyzed by researchers to develop training objectives for driver education courses. The scope of avoidance behaviors encompasses the entire accident sequence, including predisposing, preventive/defensive, evasive, impact, and post-accident phases. Types of accidents are classified as single vehicle, intersecting vehicle, overtaking vehicle, converging vehicle, oncoming vehicle, pedestrian, and miscellaneous. Drivers are classified as burdened and privileged. General procedures for accident investigation are outlined, as are steps in identifying avoidance behaviors.

by James A. McKnight; Rex D. Hume
Indiana Univ., Inst. for Res. in Public Safety, Bloomington, Ind. 47405
DOT-HS-7-01811
Rept. No. DOT-HS-7-01811-79-TF(2); PB-298 768 ; 1979 ; 96p
Rept. for Oct 1977-Feb 1979. Vol. 1, A Review of Existing Data Bases and Recommendations for Future Data Collection, is HS-804 746.
Availability: NTIS

HS-804 772

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT

A generalized methodology has been developed for mathematically optimizing simulated vehicle crash performance for a wide range of realistic accident encounters. The methodology utilizes approximating functions, derived from multi-degree-of-freedom dynamic simulations, to calculate vehicle and occupant dynamic responses in a large number of simulated collisions. Biomechanical relationships are used to convert the occupant responses into estimates of injury, which are weighted and summed for all the simulated accidents to produce an overall measure of crash performance. An optimization algorithm systematically searches selected simulated vehicle design variables for the set which minimizes the weighted sum of injuries within practical limits set by the analyst. As an example of the application of the methodology, a computer program was developed to optimize the crash performance of a simulated 3000 lb vehicle operating in the mid-1980's traffic environment. Two example optimization runs, for belt and air bag restraints, have been conducted. In this current effort, the optimization methodology, which was developed by Ford in Phase 1 of the Research Safety Vehicle program, was refined and extended to produce the current optimization model. The methodology and model refinements are documented, and example model results presented, as well as recommendations for further development of the model.

by S. E. Rezabek; Matthew Huang; David Yu; S. E. Henson; W. R. Buell
Ford Motor Co., Automotive Safety Office, P.O. Box 2053, Dearborn, Mich. 48121
DOT-HS-6-01446
1978 ; 705p refs
Rept. for 15 Sep 1976-30 Nov 1978. Vol. 1, Introduction and Executive Summary, is HS-804 771.
Availability: NTIS

HS-804 777

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT

The effectiveness of three versions of the Defensive Driving Course (DDC) was evaluated within the context of referral to treatment from Seattle's Special Adjudication for Enforcement (SAFE) system. The SAFE system has in common with the administrative adjudication approach the elimination of a formal courtroom appearance, and it is unique in that a para-judicial (magisterial) system is employed. A magistrate may refer a traffic offender to a driver improvement analyst for diagnosis and/or counseling or direct referral to one of several driver improvement programs. Three versions of the DDC were evaluated as rehabilitation alternatives: the standard 8-hr classroom Driver Improvement Program (DIP); a programmed learning version of the DDC consisting of a tape-recorded lecture series and student workbook augmented by four hours of classroom instruction; and a second programmed learning course consisting of the same recorded materials and self-instruction workbook plus a 1-hr classroom meeting primarily for testing purposes. A no-treatment control group was included. The evaluation examined the impact of the exceptions made to predesignated treatment assignment and assessed the relative effectiveness of each course version. The impact of the exceptions was found to be minor. A few differences in group composition were found but multiple regression analytic techniques controlled for the potentially biasing effects of these variables. Modest but significant reductions in citation recidivism were detected for the DIP version of the course. It is recommended that the DDC be further explored and evaluated as a potentially valuable driver rehabilitation treatment.

by Philip M. Salzberg; Carl L. Klingberg
Washington State Dept. of Licensing, Res. and Technology Div., Olympia, Wash. 98504
DOT-HS-343-3-682
Rept. No. DOL-NHTSA-78-1 ; 1978 ; 65p 6refs
Rept. for Jul 1977-Apr 1978.
Availability: Reference copy only

HS-804 780

OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT

Intended as a working guide to individuals and organizations involved in efforts to gain legislative approval of general safety belt usage or child restraint laws, this handbook contains information and data to support arguments on behalf of occupant restraint legislation, and to overcome nonsupporter objections and reservations, and strategies, tactics, and methods for communicating the above data to state legislators, traffic safety officials, police officials, media representatives, and others. The focus of the manual is on developing effective state-level campaigns to obtain passage of occupant restraint laws. Appended are a document containing information needed by proponents to argue effectively the case for occupant restraint legislation (designed for distribution as an informational booklet), examples of safety belt usage legislation, and references to general information on safety belts, societal costs associated with motor vehicle accidents, attitudinal studies and surveys related to safety belt usage, research related to compulsory safety belt usage laws, constitutionality of safety belt usage laws, compulsory safety belt usage laws in foreign countries, and public information and education campaigns on safety belt usage.

by William B. Wilson
Teknekron, Inc., 1483 Chain Bridge Rd., McLean, Va. 22101
DOT-HS-7-01644
Rept. No. PB-298 461 ; 1979 ; 137p refs
Rept. for Apr 1977-Feb 1979. See also HS-804 781, "Safety Belt Usage Attitude Study."
Availability: NTIS

HS-804 783

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES

The following U.S. motor vehicle traffic fatality data from 1975 to 1978 are tabulated and discussed: fatality rates according to registered vehicles, vehicle miles traveled, licenses issued, and population; fatalities by vehicle type and for pedestrians; fatalities by posted speed limit; state-by-state and regional comparisons of fatalities and rates; and fatalities by age groups. Traffic fatality estimates for the first four months of 1979 show an alarming increase over 1978 for the first three months (up 13.8%, 19.2%, and 12.4%, respectively) while Apr 1979 increased by only 2.2% over Apr 1978. Weather conditions and increased travel are considered to be the primary factors accounting for the large increases. Traffic fatalities in 1978 were 12.6% higher than in 1975 and are continuing to rise in 1979. The increase was primarily among occupants (or riders) of motorcycles (41% increase), light trucks, including pickups, vans, and four-wheel drive vehicles (37% increase), and heavy trucks (41% increase). Fatalities as a function of population have risen by about 10% over the 1975-1978 period, primarily due to increased vehicle use; other fatality rates have remained relatively constant. The increase of fatalities on high-speed highways has been substantial (25% over the 4-year period), while the increase on lower speed roads has been almost negligible. Reduced availability of gasoline is likely to reduce overall fatalities in 1979.

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, NRD-34, 2100 2nd St., S.W., Washington, D.C. 20590
Publ: Highway Safety Facts. Special Ed. (May 1979)
1979 ; 11p
Availability: Corporate author

HS-804 784

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1

The Restraint System/Speed Limit Public Information Materials Catalog is designed for use by persons developing public information programs on restraint systems and speed limits. Section 1 pertains to restraint systems. The first part contains a list of promotional materials which are listed alphabetically by organization name and arranged by type of material (movies, print ads, pamphlets, news releases, promotional gimmicks such as calendars, television and radio spots, posters, bumper stickers, television and radio scripts, editorials, audiotapes, slides). Three broad subject headings (child restraints, general restraint systems, passive restraints) are provided under which are listed the organizations which have produced pertinent materials. The second part lists articles and reports, arranged by title. Organization and author indexes are provided. Section 2, pertaining to speed limits, is similarly arranged. The subject headings for the promotional materials are accident/injury reduction, fuel/energy conservation, holiday driving, minority/youth, and police functions/laws. No indexes are provided for the articles and reports. Materials and reports may be borrowed free of charge for three weeks and may be renewed depending upon demand. Requests may be mailed or telephoned to the Univ. of Michigan, Hwy. Safety Res. Inst., Public Communication Proj.

by Ann C. Grimm, comp.
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
NHTSA-8-0391
Rept. No. UM-HSRI-79-28 ; 1979 ; 26p refs
Availability: Corporate author

HS-804 785

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3

The Alcohol/Safety Public Information Materials Catalog is designed for use by persons developing public information programs on alcohol and highway safety. Part 1 contains a list of promotional materials which are listed alphabetically by organization name and arranged by type of material (pamphlets, posters, audiotapes, radio and television spots, news releases, bumper stickers, promotional gimmicks (e.g. matchbooks), print ads, bus cards/transit advertising, movies, radio and television scripts). Nine broad subject headings (alcoholism, the disease; alternatives to drunk driving; drugs other than alcohol; legal aspects; minority groups/youth; physiological impairment; general information; responsible drinking/know your limits; social drinking) are provided under which are listed the organizations which have produced pertinent materials. Part 2 lists articles and reports, arranged by title. Organization, author, and subject indexes are provided. Materials and reports may be borrowed free of charge for three weeks and may be renewed depending upon demand. Requests may be mailed or telephoned to the Univ. of Michigan, Hwy. Safety Res. Inst., Public Communication Proj.

by Ann C. Grimm, comp.
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
NHTSA-8-0391
Rept. No. UM-HSRI-79-29 ; 1979 ; 28p refs
Availability: Corporate author

HS-804 791

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT

The development of the three-way catalytic converter is traced from its origins in automaker and chemical firm research in the 1950's, to present plans preparing the system to be the auto exhaust emission control device most widely used on American cars in the 1980's. Among multiple forces leading to the decision by major automakers in the late 1970's to adopt the system were tightening exhaust emissions regulations; the development of low-cost, mass-producible system components; and institutional factors, including strong system advocates, internationalization of the auto industry, and the desire of certain technology-oriented automakers to defend their U.S. market shares by adoption of the system. It is concluded that the three-way catalytic (TWC) converter system may become the dominant emission control device for American-market cars in the 1980's if problems are resolved relating to adaptation of the system to 6- and 8-cylinder engines, reduction in requirements for precious metals, and the development of secure sources of supply for those metals. Appended are the auto pollution control device introduction schedule, illustrations of three major current TWC converter systems, tentative supply network for TWC systems, and tabulations of fuel economy and emissions for vehicles with advanced conventional engine systems, and of 50-state fuel economy figures for various manufacturers.

by Daniel Dexter
Lexington Technology Associates, 10 Wingate Rd., Lexington, Mass. 02173
DOT-TSC-1355
Rept. No. DOT-TSC-NHTSA-79-36 ; 1979 ; 52p 74refs
Rept. for Apr-Dec 1978.
Availability: NTIS

HS-804 792

TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT

A study initiated in July 1974, under Contract DOT-HS-4-00920 was continued to quantify the wear characteristics of six different passenger tire constructions: two radial, two bias, and two bias belted groups. Comparison road tests were conducted in three widely separate locations to determine possible effects of different pavement types on the treadwear relationships between the convoy road test method and the previous accelerated wear technique. The study confirmed the results of the earlier program, which concluded that accelerating tire treadwear rates by a significant factor does not distort the rank order of the treadwear comparison of those tires tested. It was concluded that the mechanism of tire wear is not a function of the rolling distance of the tire, but of the sliding distance of the tire tread elements in contact with the road; the free rolling resistance of these tires requires less energy than the distance the tire is required to slip. Road design and surfacing material can play a more significant role in tire wear than tire construction, compound, design or manufacturer. It was concluded that while a mil of rubber and the miles to which it relates is not a significant indicator of relative tread loss, the functional relationship of a unit of tread volume loss to the slip energy invested at the tire/road interface is significant.

by Henry C. Hodges; Kevin D. Koch
Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nev. 89701
DOT-HS-6-01347
Rept. No. 20-1-980 ; 1979 ; 258p
Rept. for 1976-78.
Availability: NTIS

HS-804 832

FARS, FATAL ACCIDENT REPORTING SYSTEM, 1978 ANNUAL REPORT

The first of two volumes (the second containing supporting data) of the fourth annual FARS (Fatal Accident Reporting System) activity report contains statistical tables and graphs of data on fatal motor vehicle traffic accidents in the 50 states and the District of Columbia taken from the FARS file for the years 1976 through 1978 (99% complete as of 20 Apr 1979). The data are drawn from various sources from state to state, but generally include police accident reports, driver license files, motor vehicle registration files, vital statistics, and state highway department records. These sources are supplemented occasionally by emergency medical service reports and hospital records. A summary of 1978 statistics is followed by sections covering fatalities, state statistics, accidents (collision, environment), vehicles (passenger cars, motorcycles, pickups/vans, trucks, school buses), occupants (alcohol, restraints, age, convictions), and pedestrians/pedalcyclists. In 1978, there was a total of 50,226 people killed in the U.S. in 44,336 fatal accidents; fatalities per 100 million vehicle miles traveled increased between 1977 and 1978 by 0.9%; the number of vehicles and motorcycles in fatal accidents increased by 6% and 10%, respectively, over 1977.

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
1979 ; 49p
Availability: GPO

HS-804 834

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS

Regressional analyses were used to estimate the strength of the relationship among driver education enrollment, laws requiring driver education for licensing before age 18, and the rate of licensing of 16-and 17-year-olds in the U.S. Results show that driver education is significantly and positively related to the licensing rate of these youth, that this relationship is much weaker than that reported by Robertson and Zador (coefficient for regression of driver licensing on driver education was .80 vs. .25 for the present study), that the relationship was not greatly diminished when economic and mobility factors were controlled, that the relationship was considerably stronger between 1971 and 1975 (.42) than between 1965 and 1970, and that the presence of driver education laws had a significant negative relationship with licensing of young drivers and a significant positive relationship with driver education enrollment. These results suggest that driver education probably accounts for some increase in the licensing of young drivers.

by W. Burleigh Seaver; James L. Nichols; William L. Carlson; Robert B. Voas
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 39p refs
Based, in part, on NHTSA Technical Note, "An Analysis of the Impact of Driver Education on the Licensing of 16 and 17 Year Olds" (1979).
Availability: Reference copy only

HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT

Seven hundred motor vehicle/bicycle accidents were investigated in-depth, data coded and stored, and analysis performed with the objective of determining countermeasures. Exposure measures were taken at each accident site during the same period of time under matching environmental circumstances. Univariate analysis of the data file was conducted to provide some insight into the principal factors of the accident population. The analysis established that the principal cause of these accident types was human error, with the bicyclist making the majority of the errors. The younger age groups of the bicyclists were statistically overrepresented; there was no significance associated with the sex of the cyclist or the motor vehicle driver. Conclusions are that improvement in bicycle safety depends on simultaneous activity in three areas: education, regulation, and enforcement. Of all risk-taking behavior, riding on the wrong side of the road by bicyclists is most clearly identifiable. Support by Federal and state governments for increased bicycle safety measures is urged, including educational programs. Bicycle visibility should be improved and the lightweight hand brake should be redesigned. Studies should be undertaken on feasibility of licensing bicyclists and bicycles, of using marked bikeways on urban streets and banning bicycles during certain specified hours. Design of the bicycle should be studied for injury-inducing potential, and that of the motor vehicle continuously monitored for possibly dangerous external changes.

by H. E. Roland; B. J. Campbell; W. W. Hunter; J. R. Stewart
University of Southern California, Inst. of Safety and Systems Management, Traffic Safety Center, Los Angeles, Calif. 90007
DOT-HS-5-01231
Rept. No. 79-1-Vol-1 ; 1979 ; 338p 128refs
Rept. for Jul 1975-Feb 1979. Vol. 2, Appendices, is HS-804 841.
Availability: NTIS

HS-804 841

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT

Intended for the researcher who wishes to go beyond the results developed in Volume 1, these appendices include extensive data from 700 motor vehicle/bicycle accidents on factors affecting the bicyclists, the automobile drivers, the bicycles and motor vehicles, environmental and injury factors, and typology. Also included are sample forms used by the Safety Center, the Hollingshead Two Factor Index of Social Position, and a bicyclists' safety quiz.

by H. E. Roland; B. J. Campbell; W. W. Hunter; J. R. Stewart
University of Southern California, Inst. of Safety and Systems Management, Traffic Safety Center, Los Angeles, Calif. 90007
DOT-HS-5-01231
Rept. No. 79-1-Vol-2 ; 1979 ; 254p 1ref
Rept. for Jul 1975-Feb 1979. Vol. 1 is HS-804 840.
Availability: NTIS

HS-804 857

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979

The most current research papers on the diagnosis, referral, rehabilitation, and adjudication of persons convicted of driving while intoxicated are compiled. Research is reported on the effectiveness of programs for youthful offenders, senior adults, and social and problem drinkers.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590; National Council on Alcoholism, Washington, D.C.
1979 ; 453p refs
Includes HS-027 598--HS-027 620.
Availability: NTIS

HS-804 911

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 2, FINAL TECHNICAL REPORT

A study was conducted of the potential of unconventional motorcycle configurations for improved accident avoidance performance, including both front and rear steered motorcycles with low center of gravity and long wheelbase. Stability and obstacle avoidance characteristics were investigated analytically using mathematical models of both the uncontrolled and rider-controlled motorcycle. An analysis was also performed of the sensitivity of the optimum front-rear brake proportioning to road surface conditions and lateral acceleration. Although the rear steered configuration proved unacceptable from a control standpoint, the front steered configuration has advantages in the moderate-to-high speed regime in terms of the margin of safety in performing an obstacle avoidance maneuver, and rider skill level required in braking. These advantages accrue at the expense of low speed maneuverability and added weight, and of overall complexity of the machine; visibility and conspicuity are less satisfactory than in the conventional motorcycle. Further evaluation of safety factors and marketability is needed.

by R. Schwarz
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
DOT-HS-7-01722
1979 ; 125p 7refs
Rept. for Oct 1977-Apr 1979. Vol. 1, Summary Technical Report, is HS-804 910; Vol. 3, Appendix A, is HS-804 913.
Availability: NTIS

HS-804 913

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT

Information is provided for a series of computer programs based on a linear model with four motion degrees of freedom; lateral displacement, yaw, roll, and steer angle. Included are two programs (NORIDER and NORIDE2) which compute the eigenvalues and eigenvectors of the system of equations representing the uncontrolled motorcycle, a time simulation including a rider control model for an obstacle avoidance maneuver, and a program which computes the frequency response of a motorcycle to steer torque and rider body torque inputs. As all these programs require a description of the mass properties of the machine and rider, documentation has been included on a support program which computes the mass center and moments and products of inertia of any assemblage of masses. The geometry used for the motorcycle model underlying all the programs is illustrated and a nonmenclature list is provided.

by R. Schwarz
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
DOT-HS-7-01722
1979 ; 137p 2refs
Rept. for Oct 1977-Apr 1979. Vol. 1, Final Summary Report, is HS-804 910; Vol. 2, Final Technical Report is HS-804 911.
Availability: NTIS

HS-805 034

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT

In the continuation of an evaluation of water-coupled ultrasonics to identify tire anomalies which lead to degraded tire performance, 75 recapped test tires were obtained, including bias, bias-belted, and radial, and were scheduled for 10,000 mi of highway durability testing. This test program was undertaken to supplement data generated during a previous contract, which involved a comparison of several nondestructive test (NDT) methods, and which determined that water-coupled ultrasonics produced the most accurate and repeatable data for three-dimensionally positioning tire anomalies. In the present study, the tires generally obtained only one-third the 10,000 mi durability due to catastrophic failures and treadwear anomalies. These tires were NDT-Inspected pre- and post-testing to analyze the ability of water-coupled ultrasonics to differentiate between those tire anomalies which lead to degraded road performance and those which do not. The results show that although water-coupled ultrasonics can determine anomalies, the effectiveness of the device depends on the experience of the data analyst. Application of water-coupled ultrasonics will be limited until a data base is established that enables anomalies to be appropriately identified.

by Henry C. Hodges; Henry C. Hodges, Jr.
Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nev. 89701
DOT-HS-7-01589; Ref: DOT-HS-064-3-687
Rept. No. 20-1-1021 ; 1979 ; 525p
Rept. for 1977-1979. Summary report is HS-805 035.
Availability: NTIS

HS-805 036

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT

An attempt was made to forecast the possible moped accident problem in the U.S. over the next five to ten years. The project was designed to formulate a procedure to forecast the nature and scope of the potential moped accident problem; to use the procedure to predict outcomes for input values such as sales volume, usage patterns, and crash rates; and based on the outputs, to recommend NHTSA (National Hwy. Traffic Safety Administration) research and safety program action. Results of an analysis of available data on U.S. moped sales, usage, and accident involvement are presented. After an introduction and overview of the project, some demographic information on U.S. moped riders is presented, and the typical use of the vehicle, based on various consumer surveys, is described. A descriptive analysis of moped accidents is presented, based on police-reported accident data provided by 11 states. The methods are described by which the available data were utilized to develop projections of the number of in-use mopeds and moped accidents, injuries, and fatalities through 1988. Project findings are discussed, and the following recommendations are proposed regarding future NHTSA-sponsored research: to encourage the collection of police- reported state accident data, to collect exposure data, to develop a decision analysis approach to moped safety problems, to develop and test accident countermeasures, to determine licensing requirements for moped operators, to develop licensing skill test procedures, to develop licensing knowledge test and accompanying manuals, and to develop moped helmet standards.

by William W. Hunter; J. Richard Stewart; Jane C. Stutts
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
DOT-HS-8-01887
1979 ; 179p 11refs
Rept. for Feb. 1978-May 1979. Vol. 1, Review of the Literature and Data Search, is HS-805 035.
Availability: NTIS

HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT

Results are presented for the first five of 12 full-scale staged collisions, as well as an outline of test plans and procedures used to document the events. The staged collisions were designed to develop a library of experimental data which could be used to validate accident reconstruction techniques such as SMAC (Simulation Model of Autobile Collision) and CRASH (Calspan Reconstruction of Accident Speeds on the Highway). The test matrix focused on data gaps indentified in Phase 1 (Vol. 1) involving intermediate- and subcompact-size vehicles. Collision configurations included frontal, side, and rear impacts with both cars moving at velocities up to 40 mph. The vehicles measured parameters such as: vehicle compartment accelerations (X, Y, Z components); angular yaw velocity; compartment pitch, roll and yaw angle; wheel angular velocities; steer angle; and vehicle trajectory. Each collison was photographically covered with ten high-speed, 16 mm data cameras. Occupant injury criteria data were obtained on the driver and front seat passenger in the target vehicle according to Federal Motor Vehicle Safety Standard 208 requirements.

by Norris E. Shoemaker
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-7-01511
Rept. No. ZQ-6057-V-4 ; 1978 ; 441p 3refs
Rept. for Jun 1977-Dec 1978. Vol. 1, Development of Data Bank, is HS-805 037; Vol. 3, Staged Collisions: Tests No. 6 Through No. 12, is HS-805 039; Vol. 4, Staged Collision Reconstructions, is HS-805 040.
Availability: NHTSA

HS-805 039

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT

Results are presented for the last seven of 12 full-scale collisions. The staged collisions were designed to develop a library of experimental data which could be used to validate accident reconstruction techniques such as SMAC (Simulation Model of Automobile Collisions) and CRASH (Calspan Reconstruction of Accident Speeds on the Highway). The test matrix focused on data gaps identified in Phase 1 (Vol. 1) involving intermediate- and subcompact-size vehicles. Collision configurations included frontal, side, and rear impacts with both cars moving at velocities up to 40 mph. The vehicles measured parameters such as: vehicle compartment acceleration (X, Y, Z components); angular yaw velocity; compartment pitch, roll and yaw angle; wheel angular velocities; steer angle; and vehicle trajectory. Each collision was photographically covered with ten high-speed, 16 mm data cameras. Occupant injury criteria data were obtained on the driver and front seat passenger in the target vehicle according to Federal Motor Vehicle Safety Standard 208 requirements.

by Norris E. Shoemaker
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-7-01511
Rept. No. ZQ-6057-V-5 ; 1978 ; 579p
Rept. for Jun 1977-Dec 1978. Vol. 1, Development of Data Bank, is HS-805 037; Vol. 2, Staged Collisions: Tests No. 1 Through No. 5, is HS-805 038; Vol. 4, Staged Collision Reconstructions, is HS-805 040.
Availability: NHTSA

HS-805 043

DRIVER LICENSING. REV. ED.

This bibliography represents literature acquired since the establishment of the National Hwy. Traffic Safety Administration (NHTSA) concerning driver licensing and driver licenses. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal "Highway Safety Literature" (HSL) and are indexed by a keyword-out-of-context listing, author, corporate author, contract number, and report number. The documents were cited in Dec 1967-Mar 1979 issues of HSL. They may be examined in the Technical Reference Branch, NHTSA. Availability is given in the individual citations.

by L. Flynn, comp.; A. J. Latchaw, comp.; A. G. Ogden, comp.; W. J. Tannahill, comp.
National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washington, D.C. 20590
Rept. No. SB-36 ; 1979 ; 320p
A revised and updated edition of SB-08, HS-802 037.
Availability: NTIS

HS-805 044

PASSIVE RESTRAINTS

This bibliography represents literature acquired since the establishment of the National Hwy. Traffic Safety Administration (NHTSA) concerning the development and use of passive restraints in motor vehicles. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal "Highway Safety Literature" (HSL) and are indexed by a keyword-out-of-context listing, author, corporate author, contract number, and report number. The documents were cited in Dec 1967-Jul 1979 issues of HSL. They may be examined in the Technical Reference Branch, NHTSA. Availability is given in the individual citations.

by Lois Flynn, comp.
National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washington, D.C. 20590
Rept. No. SB-37 ; 1979 ; 190p
Availability: NTIS

HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.

A Chevette body buck modified to accept the Minicars Res. Safety Vehicle (RSV) advanced driver restraint system was used in a series of sled tests to establish the potential benefits to be derived from installing the advanced RSV system in a current production subcompact vehicle. Tests conducted earlier using the existing Chevette driver station geometry and a modified version of the General Motors Air Cushion Restraint System (ACRS) established 30-mph barrier equivalent velocity (BEV) frontal impact protection. Results indicate that in the absence of problems created by severe upper firewall intrusion, passive driver frontal impact protection can be provided with the Minicars system to 40-mph BEV. The necessary modification of the existing driver station geometry would entail redesigning and reorienting the column assembly, providing a more involved steering assembly link-up to the steering gear box, rearranging the instrument panel, and reconfiguring the driver side lower dash to provide a knee restraint. Recommendations include complete integration of the system into the Chevette, with a detailed estimate of its associated costs; conducting a sufficient number of vehicle crash tests to define system performance in all statistically significant crash modes; and using RSV accident analysis methodology to calculate from the above the expected cost-effectiveness of the system if installed on all new vehicles in its class. Data traces for sled tests are appended.

by W. Broadhead; C. Strother
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01412
1978 ; 84p 4refs
Rept. for Aug 1976-Aug 1978. Vols. 1-2 are HS-805 052--HS-805 053; Vol. 4 is HS-805 055.
Availability: NTIS

HS-805 055

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT

A low mount air cushion restraint system (ACRS) was investigated to determine if such a system could be designed for the Vega subcompact vehicle to protect normally seated front occupants in 30-mph barrier equivalent velocity (BEV) frontal impacts. An ACRS was developed by conducting sled tests in which passenger size and position effects were also investigated. Sled test results indicate the evolved system would satisfactorily protect a wide range of normally seated occupant sizes in 30-mph impacts, although the Vega compartment deceleration signature at this condition is atypically severe; providing such a restraint would probably require extensive modification of the right side of the dashboard. A right front passenger restraint system should be designed to accommodate the 50th percentile male and 5th percentile female size occupants. The system should be further refined to protect child passengers in the proximity of the dashboard (out of position). An identical system in a subcompact vehicle with a more reasonable compartment deceleration characteristic at 30-mph BEV could require less propellant; a reduced inflator charge would have beneficial effects on the injury measures recorded during out-of-position tests. Data traces of the tests are appended.

by C. E. Strother; D. T. Zinke
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01412
1978 ; 113p 4refs
Rept. for Aug 1976-Aug 1978. Vols. 1-3 are HS-805 052--HS-805 054.
Availability: NTIS

HS-805 061

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT

Analytical and experimental studies related to braking signals which indicate deceleration level were conducted in order to select a limited set of such signaling concepts for field evaluation of their effectiveness in reducing rear-end crashes. Literature reviews of prior simulator, driving, and field tests, as well as accident data analyses, indicated that braking deceleration signals would have limited applicability, but one field test produced a large reduction in rear-end crashes. Potential means of coding rear lighting deceleration signals were developed, and were subjectively evaluated in day and night driving. A study of flash rates showed that not more than three rates could be discriminated between 1 Hz and 9 Hz, with an automotive bulb. Based on the foregoing tests, a driving test was used to evaluate brake signaling displays, including deceleration signals and a simulated brake signal failure. Measures related to car-following and rear-end collision performance were clearly degraded by the brake signal failure, and there were a few differences between the conventional and experimental configurations. Measurement of the braking deceleration distributions used by taxis and motor pool vehicles showed that taxis are a suitable fleet for field testing braking deceleration signals, based on over 30,000 mi. of exposure in both groups. Five configurations of braking signals are recommended for evaluation in a field test of their effects on rear-end crashes.

by Rudolf G. Mortimer
University of Illinois, Dept. of Health and Safety Education, Champaign, Ill. 61820
DOT-HS-6-01447
Rept. No. Safety-Res-79-2 ; 1979 ; 198p 25refs
Rept. for Sep 1976-Mar 1979.
Availability: NTIS

HS-805 064

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 1: SUMMARY REPORT. FINAL REPORT

by Herbert A. Jahnle
Budd Co., Technical Center, 375 Commerce Drive, Fort Washington, Pa. 19034
DOT-HS-6-01479
Rept. No. TCR-0385 ; 1979 ; 22p 1ref
Rept. for Oct 1976-May 1979. For abstract, see Vol. 2, HS-805 065.
Availability: NTIS

HS-805 065

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 2: FINAL REPORT

Candidate materials which might be used in future automotive structures were evaluated in terms of general materials properties, availability, manufacturability, cost and their effects on crashworthiness, durability, and nondamageability. Body on frame, unibody, and unibody van vehicle structures were analyzed using finite-element analysis and mass-spring modeling to determine limits and boundaries of materials application. It is concluded that low carbon steel will remain the primary candidate material based on current cost projections, with the use of high strength low alloy (HSLA) steel replacing it in some applications. Vehicle first cost in dollars will increase with the use of the candidate materials. Raw materials are available to permit the extensive application of aluminum alloys, HSLA steels, plastic, and glass/or carbon fiber-reinforced composites in future automotive structures. Mill capacity will continue to remain marginal, on a supply-demand basis, vehicle durability and crashworthiness comparable to that with low carbon steel are achievable with the alternate materials at a weight reduction. Front and rear end nondamageability can be improved with alternate materials, especially elastomeric plastics, without weight penalty. Aluminum alloys and glass-reinforced composites will continue to compete for hang-on components, the former material being more expensive but offering greater weight reduction. Plastics applications, as elastomerics, will increase for front and rear end nondamageable energy management up to 15 mph to 20 mph. New process developments such as reaction injection molding will increase plastics potential in exterior body panels for weight reduction and cost effectiveness. New material developments in laminate or composite forms such as metal skin thermoplastic laminate and mixed fiber hybrid composites provide potential weight reductions at lower cost penalties, when combined with a steel space frame design.

by Herbert A. Jahnle
Budd Co., Technical Center, 375 Commerce Drive, Fort Washington, Pa. 19034
DOT-HS-6-01479
Rept. No. TCR-0385 ; 1979 ; 502p 104refs
Rept. for Oct 1976-May 1979. Vol. 1, Summary Report, is HS-805 064.
Availability: NTIS

HS-805 067

LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT

An analytical and experimental program was conducted to design a long-life brake system for passenger vehicles which would double the length of intervals between servicing of conventional systems. The design approach was constrained to be compatible with existing vehicle configurations and not to differ radically in braking principle. Formal study objectives were to analyze the state of the art of hydraulic brake systems in order to identify system assembly and/or component design requirements which will assure a significant increase in service life without maintenance and repairs, and without affecting safety, performance, or fuel economy; to develop techniques which can be utilized objectively in quantifying system durability; and to recommend procedures suitable for use in compliance testing. Service life was initially found to be defined by friction pair maintenance in the 30,000 mi. to 40,000 mi. range. Subsequent servicing requirements were necessitated by a number of inhibiting mechanisms derived in large part from fluid degradation, metal corrosion, and rubber deterioration. A long-life design approach was specified, satisfying a doubled friction pair lifetime and a 100,000 mi. balance of system service-free life. Component-by-component design approach alternatives are given, and three test procedures described for evaluating compliance with the postulated standard. Benefit-cost analysis demonstrated that the benefits of reduced accidents and consumer maintenance outweigh the costs.

by R. Ziskind; I. Osofsky; Y. Mansoor; F. Oldham; D. Couts
Science Applications, Inc., 1801 Ave. of the Stars, Suite 1205, Los Angeles, Calif. 90067
DOT-HS-7-01776
Rept. No. SAI-068-80-516 ; 1979 ; 217p refs
Rept. for Oct 1977-Mar 1979.
Availability: NTIS

HS-805 069

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT

The tasks are outlined in developing a workbook and cassette tape module for a self-instruction orientation course on Administrative Evaluation of Highway Safety Programs to be added to a set of seven modules prepared in 1976 and 1978 on various highway safety management subjects. The modules are distributed for use by new personnel hired by State Highway Safety Offices and by other employees requiring refresher training in specific aspects of the Highway Safety Program. This latest module represents the current policies and procedures for administrative evaluation of highway safety projects at National Hwy. Traffic Safety Administration and state agencies.

by Marie Smith
Pabon, Sims, Smith and Associates, Inc., 1435 G St., N.W., Suite 603, Washington, D.C. 20005
DOT-HS-8-02063
1979 ; 14p refs
Rept. for Oct 1978-Apr 1979.
Availability: NTIS

HS-805 070

CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT

Four three-year-old-child dummies, SA 103C models, were tested at the Univ. of Michigan's Hwy. Safety Res. Inst. (HSRI) and the National Hwy. Traffic Safety Administration Engineering Test Facility at TRC (Transportation Res. Center) of Ohio in order to determine the ranges of responses of the test dummies in specified calibration testing and to diminish or eliminate the variability of responses obtained in earlier tests at the two facilities. The dummy head accelerator mounting was revised to reduce ringing, and the rib cage structure attachment modified to eliminate bottoming. A revised loading fixture was designed to facilitate the lumbar spine calibration. The modified dummies produced consistent calibration response data within the proposed limits of Docket 78-09 at both (HSRI and TRC) labs. Several procedures are recommended for reducing the level of dependency on technique in dummy calibration. The impact point on the chest should be remeasured and remarked on the chest skin before each impact to obtain consistent response data. An improved suspension system for the impact piston should be investigated which would provide better trajectory control. Consideration should be given to a slightly spherical rather than planar face on the impact piston to reduce the effects of off-center impacts due to the irregularities of the molded dummy skin.

by Joseph B. Benson; John W. Melvin
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-HS-6-01367
Rept. No. UM-HSRI-79-4 ; 1979 ; 70p 1ref
Rept. for 1 Feb 1977-1 Nov 1978. See also HS-803 530 and HS-805 071.
Availability: NTIS

HS-805 071

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT

Four SA103C three-year-old-child dummies were first tested in a series of static and dynamic component tests in accordance with test procedures specified in the proposed standard 49 CFR, Part 572, Subpart C. A series of 60 whole dummy performance tests was then conducted on an HYGE accelerator sled with each dummy tested in a sequence of six replicate runs in two different child restraint seats (GM Love Seat and Chrysler Mopar Safety Seat). At sled impact velocities of 30 mph and 20 mph, the following primary measures of dummy sled test performance were analyzed statistically: peak head resultant acceleration, peak chest resultant acceleration, maximum head center of gravity horizontal displacement, and maximum knee horizontal displacement. Analysis of the absolute deviations of each data point from the overall means demonstrated that the dummy variations were within an acceptable level for all performance measures. Performance comparison overlay time history graphs are presented for direct comparisons. Analysis of variance of sled test data, and sample calculations of the statistical analyses are appended.

by Kenneth N. Naab; A. Stephen Baum
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-8-02022
Rept. No. 6385-V-1 ; 1979 ; 137p 6refs
Rept. for Sep 1978-Jun 1979. See also HS-805 070.
Availability: NTIS

HS-805 072

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT

It is recommended that the National Driver Register Rapid Response System (NDR3S) be implemented using a public packet switched network because of its high availability (99%), very short meantime to repair (seconds), simplicity of operation, and moderate costs. This approach provides the Federal government the greatest flexibility during the initial stages of system implementation and growth. A continuing task of the NDR staff should be that of monitoring the performance, composition, and cost of the system. When the design has been stabilized and the terminal population is adequate, a government-operated system might be implemented. It is planned to operate a demonstration system during FY 1981 consisting of three rapid response states and one remote batch only state. Following evaluation of this demonstration system, the system will be expanded at the rate of three rapid response states per year through FY 1984 and four per year thereafter. Remote batch only states will be added at the rate of one year to a (presently known) total of seven. Results are presented of an analysis of the manner in which computer systems operated by state driver register systems can be connected to the NDR3S computer operating at the Transportation Computer Center in Washington, D.C. An implementation plan is presented, depicting the sequencing and dependencies of about 60 major events during the NDR3S system life. Cooperative agreements that must be executed by the Federal government and participating states are presented. Also provided is a privacy and security plan for the NDR3S.

by Wallace E. Nickel; Gerald Sieracki; Gerald Mueller; James Wood, 2nd.; Richard Deal
Richard L. Deal and Associates, 10560 Main St., Fairfax, Va. 22030
DOT-HS-7-01642
1978 ; 260p 6refs
Rept. for May 1977-Mar 1978.
Availability: NTIS

HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT

Testing was undertaken to analyze the interrelationships between and the effects of automobile interior surfaces on driver injury in frontal impacts of subcompact vehicles. At velocities near 20 mph, variations in steering wheels, steering columns, and knee restraints did not substantially affect the driver's injury severity as described by Federal Motor Vehicle Safety Standard 208. At velocities near 25 mph, effects of these variations became evident. Steering wheels which deform easily in a mode which aligns the steering wheel rim and hub to the driver's torso resulted in significant reductions in the driver's chest injury severity. The tube and mandrel type steering column, designed to reduce binding due to bending forces, produced less chest injury. The passive knee restraint substantially increased driver femur forces. With no knee restraint, the driver submarined under the steering wheel and instrument panel; with the knee restraint, the forward translation of the driver's knees was restricted, causing the driver to rotate about the H-point into the steering wheel and windshield. This reduced head and chest injury, but contributed to neck hyperextension.

by Kingdon Humann; Anil V. Khadilkar
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01449
Rept. No. FR-1061-07-79(ES) ; 1979 ; 20p 11refs
Rept. for Sep 1976-Jul 1979. Vol. 1, Analysis of Accident Data, Engineer's Point of View, is HS-805 074; Vol. 2, Analysis of Accident Data, Statistician/ Analyst's Point of View, is HS-805 075; Vol. 3, Appendices, is HS-805 076. All of these are interim reports.
Availability: NTIS

HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT

Automobile accident cases were analyzed statistically in an effort to determine the injury-causing factors involved in subcompact vehicle driver/steering wheel assembly interaction during impact. Principal component, contingency table, and discriminant function analyses were applied to data sets consisting of 108 MDAI (multidisciplinary accident investigation) team cases and 53 cases recorded by the Univ. of Birmingham (England) Accident Res. Unit. Frontal impacts involving unrestrained drivers were analyzed. The analysis developed a methodology for the determination and illustration of injury-causing and injury-indicating factors in automobile accidents. For the MDAI file, it was found that injury was strongly related to steering wheel rim damage, and exhibited a highly probable interaction with floor deformation. For the Birmingham file, injury exhibited a significant interaction with steering wheel spoke damage, and a highly probable interaction with the case vehicle damage energy. For the MDAI file, injury exhibited a substantial relationship with the total change in case vehicle velocity, was strongly related to whether the direction of principal force was nearest zero degrees or 30 degrees, and showed a highly probable interaction with occupant height. For the Birmingham file, injury was strongly related to total change in velocity and occupancy age. A contingency table analysis of the combined files standardized for their statistical differences indicated that the Vega (almost exlusively in MDAI file) steering column energy-absorbing device is most effective in cases of minimal deformation, while the Capri (exclusively in Birmingham file) column is most effective in cases of severe deformation.

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Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01449
Rept. No. IR-1061-06-79-(I) ; 1979 ; 100p 22refs
Rept. for Sep 1976-Jun 1979. Executive Summary is HS-805 073; Vol. 2, Analysis of Accident Data, Statistician/Analyst's Point of View, is HS-805 075; Vol. 3, Appendices, is HS-805 076.
Availability: NTIS

HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT

Automobile accident cases were analyzed statistically in an effort to determine the injury-causing factors involved in subcompact vehicle driver/steering assembly interaction during impact. Principal component, cluster tree, contingency table, and discriminant function analyses were applied to data sets consisting of 108 MDAI (multidisciplinary accident investigation) team cases and 53 cases recorded by the Univ. of Birmingham (England) Accident Res. Unit. Frontal impacts involving unrestrained drivers were analyzed. The analysis developed a methodology for the determination and illustration of injury-causing and injury-indicating factors in automobile accidents. For the MDAI file, it was found that injury was strongly related to steering wheel rim damage, and exhibited a highly probable interaction with floor deformation. For the Birmingham file, injury exhibited a significant interaction with the case vehicle damage energy. For the MDAI file, injury exhibited a substantial relationsip with the total change in case vehicle velocity, was strongly related to whether the direction of principal force was nearest zero degrees or 30 degrees, and showed a highly probable interaction with occupant height. For the Birmingham file, injury was strongly related to total change in velocity and to occupant age. A contingency table analysis of the combined files standardized for their statistical differences indicated that the Vega (almost exclusively in MDAI file) steering column energy-absorbing device is most effective in cases of minimal deformation, while the Capri (exclusively in Birmingham file) column is most effective in cases of severe deformation.

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DOT-HS-6-01449
Rept. No. IR-1061-06-79-(II) ; 1979 ; 191p 23refs
Rept. for Sep 1976-Jun 1979. Executive Summary is HS-805 073; Vol. 1, Analysis of Accident Data, Engineer's Point of View, is HS-805 074; Vol. 3, Appendices, is HS-805 076.
Availability: NTIS

HS-805 076

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT

Automobile accident cases were analyzed statistically in an effort to determine the injury-causing factors involved in subcompact vehicle driver/steering assembly interaction during impact. Principal component, contingency table, and discriminant function analyses were applied to data sets consisting of 108 MDAI (multidisciplinary accident investigation) team cases and 53 cases recorded by the Univ. of Birmingham (England) Accident Res. Unit. Frontal impacts involving unrestrained drivers were analyzed. These appendices contain the following information: coding and distribution of significant variables; sample collision performance and injury report used for MDAI data; sample accident investigation report, Univ. of Birmingham; MDAI data codebook; Birmingham data codebook; listing of accident cases and important variables for the MDAI 108, MDAI 78, and Birmingham 53 data files; example of a CRASH (Calspan Reconstruction of Accident Speeds on the Highway) 2 computer simulation; and frequency distributions and classifications for important MDAI and Birmingham variables. Appended is a discussion of the measurement of thoracic injury in collision simulations using anthropomorphic dummies.

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DOT-HS-6-01449
Rept. No. IR-1061-06-79-(III) ; 1979 ; 105p 17refs
Rept. for Sep 1976-Jun 1979. Executive Summary is HS-805 073; Vol. 1, Analysis of Accident Data, Engineer's Point of View, is HS-805 074; Vol. 2, Analysis of Accident Data, Statistician/Analyst's Point of View, is HS-805 075.
Availability: NTIS

HS-805 079

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT

Research was conducted using the first full-scale crosswind disturbance test facility in the U.S., a facility developed for the National Hwy. Traffic Safety Administration which is capable of providing a 35 mph crosswind for a nominal 120 ft test length. The crosswind responses of 20 different vehicle models (8 conventional cars (plus 4 trailers), 2 station wagons, 3 light trucks (one with camper), 3 vans, and 4 two-wheelers (including a moped and a bicycle)) were surveyed, and complete instrumented vehicle tests were conducted on 5 of these vehicles (Honda Accord, Chevrolet Station Wagon (alone and with a 17-ft trailer), Ford Econoline E300 Van, VW Microbus, and Ford F-250 pickup/Pilgrim cabover camper). Three test procedures (steering fixed, steering free, and driver control of lane position) were used in three different cross wind disturbance configurations (straight pulse, doublet pulse, and a shaped profile). Results show that passenger cars, station wagons, trucks, and most vans have virtually no crosswind sensitivity problems; potential problems were found for the VW Microbus, and the pickup/camper (in winds higher than 35 mph), cars pulling trailers, and mopeds. Key vehicle parameters dictating this yaw response sensitivity are the distance between the aerodynamic and tire force centers, tire restoring moment (including understeer gradient), and the basic aerodynamic side forces. A simple analytical relationship in these terms was developed to predict steady-state yaw rate in steady winds. Collected results led to recommendations for the most useful test procedures, performance measures, crosswind configurations, and definitions of the relationship between subjective driver ratings and objective measures. This last step represents the first attempt at defining maximum allowable limits of vehicle crosswind sensitivity.

by Richard H. Klein; Jeffrey R. Hogue
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
DOT-HS-7-01716
Rept. No. STI-TR-1117-1-II ; 1979 ; 187p 62refs
Rept. for 30 Sep 1977-30 Mar 1979. Vol. 1, Executive Summary, is HS-805 078.
Availability: NTIS

HS-805 082

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY

This annotated review of the legal and law-related literature published between Jul 1974 and Jul 1978 on the subject of alcohol and other drug involvement in highway crashes includes articles published in American and foreign English language journals and periodicals, as well as nine books. The first part of the review, covering journals and periodicals, is divided into the following categories: legal issues arising under anti-drunk driving laws, special sanctions under such laws, tort liability and drunk driving, field studies on the relationship between anti-drunk driving laws and highway safety, and law in foreign jurisdictions. The second part reviews the nine books. Appended are British and Canadian statutes appropriate to the subject.

by Joseph W. Little; Bradley S. Hartman
National Safety Council, 444 North Michigan Ave., Chicago, Ill. 60611
DOT-HS-7-01663
1978 ; 64p refs
Availability: NTIS

HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]

by John R. Tucker; Michael Chi
Chi Associates, Inc., 1011 Arlington Blvd., Suite 316, Arlington, Va. 22209
DOT-HS-7-01620
1978 ; 18p 4refs
Rept. for 28 Jun 1977-30 Nov 1978. For abstract, see HS-805 084.
Availability: NTIS

HS-805 084

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]

Three research versions of the WRECKER program, a computer simulation program to analyze the response of vehicle structures under crash loading, were created by incorporating new integration methods in the WRECKER I and II programs. The integration algorithms are the variable time step Newmark, the EPISODE (Efficient Program for Integrating Stiff Ordinary Differential Equations), and the FU (explicit, variable step, fourth order procedure for systems of second order ordinary differential equations, allowing for a user-specified artificial damping term) methods. These research versions were tested with seven illustrative problems (eight node cantilever plate, cantilever beam with slave nodes, elastic plastic spring, S-frame without strain rate, frame with inclined roller support, fixed end beam with discontinuity device (hinge), and clamped cylindrical panel (tang)). Results show that the new methods are superior to the implicit method used in WRECKER II and more accurate and stable than the explicit method used in WRECKER I. Appended are descriptions of test cases, computer program input and output modifications, descriptions of programs (including listings), and a state-of-the-art report.

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DOT-HS-7-01620
1978 ; 251p 67refs
Rept. for 28 Jun 1977-30 Nov 1978. For summary report, see HS-805 083. Includes as appendix E, "State-of-the-art Report on Numerical Integration Methods for Analysis of Stiff Structural Analysis Systems."
Availability: NHTSA

HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT

Causal result tabulations and related analyses are presented from Phases 2 through 5 of a tri-level (3 levels of detail) study of traffic accident causation. Police reports and other baseline data on the Monroe County, Indiana study area were collected on the first level. On the second level, teams of technicians responded to 2258 accidents at the time of their occurrence to conduct on-scene investigations. Concurrently, 420 of these accidents were examined independently by a multidisciplinary team on the third level. Other special surveys were also conducted. One or more human factors were cited by the in-depth team as probable causes in 92.6% of the accidents. Environmental factors were cited as probable causes in 33.8% of the accidents, while vehicular factors were identified as probable causes in 12.6%. The major human direct causes were improper lookout, excessive speed, inattention, improper evasive action, and internal distraction. Leading environmental causes were view obstructions and slick roads. Major vehicular causes were brake failure, inadequate tire tread depth, side-to-side brake imbalance, tire underinflation, and vehicle-related vision obstructions. Vision (especially poor dynamic visual acuity) and personality (especially poor personal and social adjustment) were found related to accident involvement. Knowledge of the driving task was not found to be related. Information is presented in the following sections: introduction; methodology overview; causal result tabulations; trend analysis of causal results; analysis of accident severity as a function of accident causation; driver conditions and states in combination with other factors; analysis of assessment practices; second and third level comparisons; representativeness of study samples and area; and summary, conclusions, and recommendations.

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Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401
DOT-HS-034-3-535
Rept. No. DOT-HS-034-3-535-77-TAC(1)-Vol-1 ; 1977 ; 596p 32refs
Rept. for Aug 1972-Mar 1977. Cover date is 1979. Vol. 2, Special Analyses, is HS-805 086. See also HS-800 661, HS-800 850, HS-800 851, HS-801 334, HS-801 335, HS-801 631, HS-801 968, HS-805 087, and HS-805 094--HS-805 099.
Availability: NTIS

HS-805 086

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT

In conjunction with a tri-level study of traffic accident causation, several special analyses were conducted concerning human, vehicular, and environmental factors in relation to accident involvement and causation. Persons involved in traffic accidents in the Monroe County, Indiana study area were compared with a control group of drivers not involved in investigated accidents. Separate examinations were made of driver vision, driver knowledge, driver psychological and personality factors, and driver characteristics and culpability in relation to accident involvement and causation. Vision (especially poor dynamic visual acuity) and personality (especially poor personal and social adjustment) were found related to accident involvement. Knowledge of the driving task was not found to be related. It was found that culpable drivers (male and female) had significantly less road/area familiarity than did nonculpable drivers. Separate analyses employing cluster analytic and Automatic Interaction Detector procedures were made to obtain a better understanding of human, vehicular, and environmental characteristics in relation to accident causation. Major human direct causes were determined to be improper lookout, excessive speed, inattention, improper evasive action, and internal distraction. Leading environmental causes were view obstructions and slick roads. Major vehicular causes were brake failure, inadequate tire tread depth, side-to-side brake imbalance, tire underinflation, and vehicle-related vision obstructions. Other analyses involved motorcycle accidents and causes: assessment of the differences between characteristics of accidents involving motorcycles and those involving other vehicle types, comparison of tri-level study motorcycle data with 1973 Indiana State Police data, and analysis of the tri-level data in terms of accident causation. The importance of other drivers failing to see motorcyclists and the need for motorcyclists to keep headlights on, wear highly visible clothing, and decrease speed at intersections were underscored.

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DOT-HS-034-3-535
Rept. No. DOT-HS-034-3-535-77-TAC(1)-Vol-2 ; 1977 ; 317p 124refs
Rept. for Aug 1972-Mar 1977. Cover date is 1979. Vol. 1, Causal Factor Tabulations and Assessments, is HS-805 085. See also HS-800 661, HS-800 850, HS-800 851, HS-801 334, HS-801 335, HS-801 631, HS-801 968, HS-805 087, and HS-805 094--HS-805 099.
Availability: NTIS

HS-805 087

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT

Under a modification to the "Tri-Level Study of the Causes of Traffic Accidents," a special analysis was conducted to assess the validity of police-reported traffic accident data. Information theory and signal detection theory techniques were used to assess police data reliability by comparison with multidisciplinary accident investigation and technical level data collected during the tri-level study. Results indicate that the accident level variables reported by the police with least reliability were vertical road character, accident severity, and road surface composition. The most reliably reported data were those concerned with the accident location, date, and number of drivers, passengers, and vehicles. The informativeness of the police reports with respect to driver/vehicle characteristics was practically nil, with the exception of driver age, sex, and vehicle model (for which the police were correct most of the time). It was also found that police reports provided very little information regarding the presence of different human conditions and states, vehicle defects, and environmental/road deficiencies. The sensitivity of police investigators to all accident causes was low, when causes were categorized into human direct, human indirect (conditions and states), and environmental; police were more reliable in reporting human direct causes than vehicle, environment, and human indirect causes (least reliable). In the assessment of alcohol presence and involvement, a strong and significant difference existed between male and female drivers, with a lower reliability associated with females.

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DOT-HS-034-3-535
Rept. No. DOT-HS-034-3-535-(Mod.-T-3) ; 1977 ; 107p 13refs
Rept. for 28 Feb-30 Jun 1977. Cover date is 1979. See also HS-805 094--HS-805 099.
Availability: NTIS

HS-805 094

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY

Under a modification to the "Tri-Level Study of the Causes of Traffic Accidents," a separate analysis was conducted to assess the potential accident prevention and severity reduction benefits of various possible improvements in vehicle systems. Based on a review of the literature and in consultation with the National Hwy. Traffic Safety Administration, the following potential improvements were defined for assessment: vehicle life time brake components; pad/lining wear indicator; underinflation warning device; improved wet traction tires; improved maneuverability and control; standardization of driver controls; standardization, reduction, or modification of blind zones; light failure warning device; improved brake lights; cross-polarized lights and windshields; improved forward lighting; and rapid windshield defrost system. Benefits were assessed by four members of the Inst. for Res. in Public Safety's engineering staff who manually reviewed 420 individual in-depth case reports to extract additional information and to assess hypothetically the benefits derived from equipping one or more of the vehicles in each accident with each of these systems. "Possible" benefits recorded for the various systems ranged from a low of 0.5% (two accidents) for standardization of driver controls; to a high of 8.8% (37 accidents) for improved brake lights. The maximum "certain" benefit (8 accidents) was for vehicle lifetime brake components, which were also judged to be of "possible" benefit in up to 5.5% of these accidents (23).

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DOT-HS-034-3-535
Rept. No. DOT-HS-034-3-535-(Mod.-T-1) ; 1977 ; 87p 3refs
Rept. for 28 Feb-30 Jun 1977. Cover date is 1979. See also HS-805 087 and HS-805 095--HS-805 099.
Availability: NTIS

HS-805 095

TRI-LEVEL STUDY: MODIFICATION, TASK 2. FINAL REPORT ON DRIVER/VEHICLE CHARACTERISTICS RELATED TO VEHICLE CONDITION AND CAUSATION AND AN ASSESSMENT OF INDIANA PMVI [PERIODIC MOTOR VEHICLE INSPECTION] EFFECTIVENESS TO REDUCE THE FREQUENCY AND SEVERITY OF ACCIDENTS CAUSED BY VEHICULAR-RELATED MALFUNCTIONS/ DEGRADATIONS

Under a modification to the "Tri-Level Study of the Causes of Traffic Accidents," a separate study was performed to investigate the relationships between driver/vehicle characteristics and vehicle condition and accident causation. An investigation was also conducted to evaluate the effectiveness of Indiana periodic motor vehicle inspection (PMVI) in improving overall vehicle condition, and in inspecting and repairing components which were judged to have caused or increased the severity of accidents. It was found that vehicles in the poorest condition were driven by accident victims less than 20 years old, those without a high school degree, divorcees, laborers, individuals whose annual family income is less than $3000, or victims who had not taken a driver education course. Accident- involved vehicles in the poorest condition were domestic vehicles 12 years or older. Vehicles in the best overall condition were driven by accident victims aged 55 to 64, those with postgraduate or professional degrees, married persons, students, white collar workers, professionals, persons with family incomes of $15,000 or more, or those who had taken a driver education course. Accident-involved vehicles in the best overall condition were foreign and less than one year old. Vehicles implicated in accidents most frequently were old (12 years or more), more often convertibles, vans, or pickup trucks, and were driven by persons less than 20 years old. Concerning PMVI effectiveness, 51.7% of the components judged to be causally implicated in accidents were either not mandatorily inspected through Indiana PMVI, or, if inspected, were later judged to be in a failing condition at the time of inspection. Of all components checked which were defective at the time of the accident, 28.9% were judged to be defective at the time of the state inspection.

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Rept. No. DOT-HS-034-3-535-(Mod.-T-2) ; 1977 ; 82p 3refs
Rept. for 28 Feb-30 Jun 1977. Cover date is 1979. See also HS-805 087, HS-805 094, and HS-805 096--HS-805 099.
Availability: NTIS

HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION

Under a modification to the "Tri-Level Study of the Causes of Traffic Accidents," a separate analysis was conducted to determine whether driver characteristics were related to factors which were judged to cause or increase the severity of accidents. The following "causes" were considered: inattention, internal or external distraction, improper lookout, misjudgment of distance, false assumption, improper maneuver or driving technique, driving technique inadequately defensive, excessive speed, inadequate signal, improper evasive action, performance errors, alcohol impairment, mental/emotion, experience/exposure, slick roads, highway-related, ambience-related, and vehicular. Statistical tests were employed to evaluate causation differences on the basis of driver trip plan, fatigue, number of passengers, age, driving experience, vehicle familiarity, and road area familiarity. Results indicate driver fatigue, trip plan, road area familiarity, number of passengers, and age were related to factors which cause accidents. For males, vehicle familiarity and for females, driving experience were also related.

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Rept. No. DOT-HS-034-3-535-(Mod.-T-4) ; 1977 ; 62p 6refs
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Availability: NTIS

HS-805 097

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT

Under a modification to the "Tri-Level Study of the Causes of Traffic Accidents," a separate analysis was conducted to examine the characteristics and collision-producting errors of accident- and traffic violation-prone drivers. Statistical tests were employed to evaluate the differences between accident/conviction repeaters and nonrepeaters. Results indicate that accident repeaters, when compared to nonrepeaters, were more frequently young (aged 20 to 24), male, single, had attended but did not graduate from college, and caused accidents more frequently because of decision errors (specifically, improper evasive actions). Drivers with prior convictions, when compared to those with no prior convictions, were more frequently between the ages of 20 and 24, male, single, indicated that they had attended but not completed college, were white-collar workers (less frequently professionals or housewives), and caused more accidents more frequently because of excessive speed or alcohol impairment. It was found that the accident and conviction repeaters were more frequently exposed to accident risk, a factor which could account for the other effects found. The accident and conviction nonrepeaters were found to cause the accident investigated just as often as the repeaters.

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Rept. No. DOT-HS-034-3-535-(Mod.-T-5) ; 1977 ; 47p 13refs
Rept. for 28 Feb-30 Jun 1977. Cover date is 1979. See also HS-805 087, HS-805 094--HS-805 096, HS-805 098, and HS-805 099.
Availability: NTIS

HS-805 098

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING

Under a modification to the "Tri-Level Study of the Causes of Traffic Accidents," a separate analysis was conducted to assess statistically the potential causal involvement of selected vehicle factors. Accident situations in which the presence of component defects were considered to be a potential danger (vehicle control, bald tires on wet curves, brake defects and rear-end collisions, inoperable turn signals in intersection accidents while turning) were identified, and the condition of vehicles in these situations compared to that of vehicles in accidents where the component defect was considered to be of less importance. The following vehicle defects were considered: defective front or rear tread, underinflated front or rear tires, mixed tire types, inoperable turn indicators, steering freeplay, loose suspension, and brake imbalances and inefficiencies. Control variables (human, environmental, and vehicle design factors) which might themselves account for the differences found were identified, and statistical methods used to control for their effects. Results indicate that driver/vehicle combinations involved in control-loss accidents were associated with the presence of a combination of human, vehicle, and environmental factors, where poor vehicle condition was a contributing factor. Driver/vehicle combinations involved in accidents on wet curves were also associated with the presence of a combination of human, vehicle, and environmental factors, where underinflated front tires were a contributing factor.

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DOT-HS-034-3-535
Rept. No. DOT-HS-034-3-535-(Mod.-T-6) ; 1977 ; 71p 10refs
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Availability: NTIS

HS-805 099

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT

Traffic accident causation was investigated by collecting and analyzing data on three levels: police reports and other baseline data for the Monroe County, Indiana, study area were collected; teams of technicians responded to accidents at the time of their occurrence to conduct on-scene investigations (a total of 2258 investigations); concurrently, 420 of these accidents were examined independently by a multidisciplinary team. General population surveys were also conducted. Human factors were cited by the in-depth team as the probable causes in 92.6% of the accidents investigated. Environmental factors were cited as probable causes in 33.8% of these accidents, while vehicular factors were identified as probable causes in 12.6%. The major human direct causes were improper lookout, excessive speed, inattention, improper evasive action, and internal distraction. Leading environmental causes were view obstructions and slick roads. The major vehicular causes were brake failure, inadequate tread depth, side-to-side brake inbalance, underinflation, and vehicle-related vision obstructions. Vision (especially poor dynamic visual acuity) and personality (especially poor personal and social adjustment) were found related to accident involvement. Knowledge of the driving task was not shown to be related. Other findings were derived related to the following areas: cluster and automatic interaction detector analyses of accident data, motorcycle accident analysis, driver characteristics as they relate to vehicle condition and causation, reliability of police-reported accident data, and representativeness of study data.

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Availability: NTIS

HS-805 101

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT

A market survey was conducted to determine the production volume of the various automotive brake master cylinder rebuilders and the most popular models currently in use. A purchase plan for 274 rebuilt master cylinders, based on this information, was formulated. The plan also included 126 units from original equipment manufactures (OEM) and after- market manufacturers. The 400 units were tested in accordance with SAE J1153 test procedure. Test results were analyzed for compliance with the performance requirements of SAE J1154 and applicable manufacturers' specifications. Performance categories were established and used to make comparisons among the OEM, aftermarket, and rebuilt groups as well as the various manufacturers' groups. A post-test inspection was conducted in an effort to determine failure causes. The high number of unit failures which occurred during testing appeared to indicate that certain test conditions are too severe. Piston seal damage was prevalent in many master cylinder failures. Some correlation was found between the high-temperature durability test and failures due to seal damage. The OEM units, as a group, demonstrated the lowest failure rate, followed by after-market and rebuilt units. Cylinder bore measurements taken after testing indicated that some of the rebuilders may be removing excessive amounts of metal during bore reconditioning.

by R. J. Adolph; J. D. Strickler; L. M. Anstey
Value Engineering Lab., 2550 Huntington Ave., Alexandria, Va. 22303
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1979 ; 136p
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Availability: NTIS

HS-805 102

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT

Research was undertaken as one of several steps in the development of an overall analysis system for a National Accident Sampling System (NASS) currently being implemented to provide nationally-representative data on traffic accidents. Issues are explored related to the design of statistical methods to estimate the determinants of traffic accidents using NASS data. Criteria are recommended for selecting precrash variables for use in analysis. Relevant exposure measures, decision rules for their definition, and data sources are identified. A method is discussed for estimating multidimensional contingency tables from supplementary margins of varying detail and drawn from different samples which "represent" the same population. Analysis procedures are demonstrated for handling some of the peculiar problems of traffic accident data analysis and rate computation. Results of a field trial of preliminary methodology design are reported, along with recommendations for further development. A basic design for a causation methodology appropriate to NASS is recommended.

by M. L. Squires; R. D. Hume; Y. Hochberg; H. Joksch; J. Reidy; D. Zaidel; D. Shinar; J. Treat
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1979 ; 213p refs
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Availability: NTIS

HS-805 103

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT

Three two-week courses to train accident investigators and allied specialists were planned, conducted, and evaluated. Each course was conducted once during Nov 1978, Mar 1979, and May 1979 in Phoenix, Ariz., using the syllabus entitled "Multidisciplinary Highway Collision Investigation Training," developed to fulfill the training requirements of state and local teams to bring them into compliance with Highway Safety Program Standard 18. The course and training program were constructed to provide the following: full consideration and integration of specific and special areas of accident studies advocated by the National Hwy. Traffic Safety Administration; the necessary training for a State Highway Safety Program, for accident investigation and reporting; real-world, on-scene accident experience to students, using experienced instructors; formal instruction by acknowledged experts and international authorities in investigative techniques, human, vehicle, and environmental factors, new techniques, and methodology; student involvement with facilities that are devoted to automotive safety, engineering research, development, and testing, with emphasis on the crash environment; and evaluation of student assessments of course content and quality of instruction.

by Jack Baird
Dynamic Science, Inc., 8531 East Florence Ave., Downey, Calif. 90240
DOT-HS-6-01512
Rept. No. DSI-MDHCIT-4-and-5 ; 1979 ; 49p
Rept. for Jul 1978-Jul 1979.
Availability: NTIS

HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT

Results are presented of a comparative cost analysis of operational and functional concepts for the operation of three distinct National Driver Register (NDR) systems. The primary objective was to determine the costs that would accrue to the participating states and to the Federal government for operating a National Driver Register Rapid Response System (NDR-RRS) as specified in Sections 220 through 231 of the House version of the Surface Transporation Assistance Act of 1978 (HR 11733). For comparison, costs were projected for continuation of the present voluntary Batch/Mail NDR system and for a proposed voluntary RRS that NDR has been designing to augment present capabilities. It was determined that the incremental cost impact for the 1984-1990 life cycle (stated in 1979 dollars) to implement the HR 11733 system is $19,084,000 (265%) greater than the existing Federal costs and $396,931,900 (5475%) more than existing state costs. The incremental cost impact to implement HR 11733 is $11,261,600 (158%) greater than the cost to implement the proposed voluntary RRS on the Federal level and $386,062.00 (2215%) greater for the states.

by P. Blatch; C. Riviere; J. Nocerino; J. McGuire
CRC Systems, Inc., 125 Church St., Vienna, Va. 22180
DOT-HS-9-02087
1979 ; 160p
Rept. for 15 Jan-15 Apr 1979.
Availability: NTIS

HS-805 122

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT

A compilation is provided of papers presented at a symposium on commerical truck exposure estimation which was held on 9-11 Apr 1979 in Wasington, D.C. under the sponsorship of the Dept. of Transportation. The symposium agenda, questions posed and answers provided at the various sessions, and a list of attendees are included. The general areas covered by the 22 formal presentations include: background (what is exposure data, why is it needed, what does it look like), general needs (at the national level, for accident analysis), measures of truck exposures, techinques for exposure estimation, vehicular obervation techniques, and uses of exposure data.

by Martin L. Reiss, ed.
Institute for Safety Analysis, 6400 Goldsboro Rd., Washington, D.C. 20034
DOT-HS-8-02046
Rept. No. 9968-3 ; 1979 ; 275p refs
Rept. for Oct 1978-Jun 1979. Vol 1 is HS-805 121.
Availability: NTIS

HS-805 123

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT

An eddy-current, noncontacting displacement gauge for monitoring Part 572 anthropomorphic dummy chest deflections during vehicle crashes, which was developed under contract DOT-HS-7-01550, underwent evaluation at the National Hwy. Traffic Safety Administration's Safety Res. Lab., Riverdale, Md. The test series was preceded by a static calibration of the dummy/gauge configuration. The instrumented dummy was subjected to a series of high- and low-level pendulum drop tests simulating Federal Motor Vehicle Safety Standard 208. A sled test series was utilized to compare seat belt loading and corresponding chest deflection for simulated 30 mph barrier impacts. No configurational, functional, or application problems were identified during testing. Because the chest deflections observed in the sled/belt configuration were very small, it is recommended that the system undergo sled testing using a steering wheel and column and allowing the dummy to impact the wheel.

by Randolph J. Wolf
Kaman Sciences Corp., P.O. Box 7463, Colorado Springs, Colo. 80933
NHTSA-P.O.-8-0251
Rept. No. K-78-74U(R) ; 1978 ; 35p 1ref
Rept. for 4 Jan-17 Feb 1978. See also HS-805 124.
Availability: NTIS

HS-805 124

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT

An eddy-current, noncontacting displacement gauge has been developed for monitoring Part 572 anthropomorphic dummy chest deflections during vehicle crashes. The gauge is configured to be bolted to the Part 572 dummy with no modification. The guage is designed to accommodate 3 in of chest deflection, and includes oscillator and demodulator electronics within the gauge head. Linearization of the gauge's output signal as a function of dummy chest deflection is achieved by a look-up table applied to the digitized signal. Detailed calibration of the gauge/dummy configuration has verified the overall system linearity. Kaman noncontacting displacement transducer specifications are appended.

Kaman Sciences Corp., P.O. Box 7463, Colorado Springs, Colo. 80933
DOT-HS-7-01550
Rept. No. K-78-45U(R) ; 1978 ; 48p 1ref
Rept. for 12 Oct-1 Nov 1977. Cover date is 1979. See also HS-805 123.
Availability: NTIS

HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT

by J. W. Hodgson; A. J. Edmondson
University of Tennessee, Mechanical and Aerospace Engineering Dept., Knoxville, Tenn.
DOT-HS-7-01621
1979 ; 16p
Rept. for 8 Jun 1977-30 Jun 1979. For abstract, see HS-805 126.
Availability: NTIS

HS-805 126

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT

The design was reviewed of a low-cost torsion bar brake dynamometer prototype developed by AVCO under Contract DOT-HS-5-01188, to suggest changes in the design, to construct two prototypes, and to conduct tests for evaluating the prototypes against three commercially available brake testers. The original design was modified to reduce the number of power transmission components and to provide a firmer basis for the torsion bar design. Two prototypes were constructed and tested, along with three commercially available testers: a low-speed roller (Hormann), a high-speed roller with inertia capability (Sun), and a platform tester (Bear). Evaluation criteria included accuracy, repeatability, ability to detect known defects, and cost. The prototype is ranked highest using the criteria, followed by the low-speed roller; the high-speed roller and the platform tester are classified as unacceptable. It is recommended that the long-term durability of the prototype be determined by placing it in service at a periodic motor vehicle inspection facility.

by J. W. Hodgson; A. J. Edmondson
University of Tennessee, Mechnical and Aerospace Engineering Dept., Knoxville, Tenn. 37916
DOT-HS-7-01621
1979 ; 116p
Rept. for 8 Jun 1977-30 Jun 1979. For summary report, see HS-805 125.
Availability: NTIS

HS-805 127

URBAN CROSSING PROBLEMS. FINAL REPORT

In a study designed to collect data on pedestrian accident causal factors based on observation of pedestrians and pedestrian-vehicle interaction behaviors, observation data were collected using a Closed Circuit Television (CCTV) system from 36 urban intersections in two U.S. cities. Data from 6,300 street-crossing observations were analyzed to attempt further specification of certain infrequently occurring accident patterns identified in previous research, and to identify new patterns or potential accident causal types (PACTS). Fourteen PACTS were initially hypothesized, eight considered sufficiently important to recommend their further investigation; the requirements for subsequent research are specified, including a right-of-way challenge; pedestrian overreliance on a friendship group, or on other pedestrians in the crosswalk; pedestrian preoccupation or distraction by conversation; and pedestrian slow crossing. Low priority PACTS include the pedestrian caught by signal change and the driver going through crosswalk stop. Frequently occurring individual potential errors and error combinations are discussed. The CCTV system is described and evaluated. Data tables supporting the study design are appended, as well as the procedure for sampling within an intersection, descriptions of study data base variables, lists of potential errors and predisposing factors, and safe street crossing guidelines.

by Richard L. Dueker
Applied Science Associates, Inc., Box 158, Valencia, Pa. 16059
DOT-HS-5-01163
Rept. No. ASA-492 ; 1978 ; 170p 8refs
Rept. for Jun 1975-Dec 1978.
Availability: NTIS

HS-805 129

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT

Results are presented of an analysis of costs that would accrue to both the Federal government and the states, specifically and in aggregate, to meet the operational requirements for each of three alternative National Driver Register (NDR) design concepts. The three system concepts are entitled Problem Driver Pointer System, Phased-in All Driver Pointer System, and All Driver Pointer System. Also presented are summary findings from the Pt. 2 study to permit gross comparisons with the HR 11733 proposal and the current Batch/Mail System. The alternative "pointer" systems are ones in which data items maintained by the NDR consist only of driver identifiers (plus the state identification) and all records of violations and related actions are stored by the states. The HR 11733 and Batch/Mail Systems are "index" systems wherein certain substantive driver record data (revocation date, reason for revocation, etc.) are stored at the NDR. It is recommended that the Problem Driver Pointer System be chosen for implementation to improve the NDR. This recommendation is based on analyses indicating that this system is the least costly, provides the most useful information, is the most acceptable type of system to the states, and will stimulate state participation.

by J. T. Nocerino; N. Katz; C. Riviere; P. Blatch; J. McGuire
CRC Systems, Inc., 4020 Williamsburg Court, Fairfax, Va. 22032
DOT-HS-9-02087
1979 ; 156p 5refs
Rept. for 20 Apr-20 Oct 1979. Pt. 1 is HS-805 120.
Availability: NTIS

HS-805 135

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT

A major deterrent in the public acceptance of existing motor vehicle passive and active safety restraint systems, is the lack of comfort and convenience in their use. The purpose of Federal Motor Vehicle Safety Standard (FMVSS) 208, Comfort and Convenience, is to correct this deficiency by specifying standards governing belt fit, belt pressure tension, use of rear occupant emergency locking retractors, warning systems, belt guides and stand-offs, and latch plate accessibility. The domestic 1979 Model Year passenger and light truck and van fleets were analyzed for compliance. The results indicated that the 1979 fleets are generally in non-compliance in the areas of chest location and belt pressure for torso belt fit; availability of emergency locking retractors for rear seats; free standing belt guides for rear seats; and audible and indicator light warning systems for belt non-engagement. The design changes required to correct these deficiencies are relatively minor and can be instituted within the 1981 Model Year time frame. Results of an analysis of the impact on manufacturing lead time and per unit costs for rulemaking compliance are given by manufacturer and vehicle model. Appendices include the survey evaluation procedure, a sample data sheet, vehicle models and seat options, and the cost methodology.

by Theodore Taylor, Jr.; Norman F. Ludtke
Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154; Pioneer Engineering and Mfg. Co., 2500 East Nine Mile Road, Warren, Mich. 48091
DOT-HS-9-02110
1979 ; 167p
Rept. for Apr-Jun 1979.
Availability: NTIS

HS-805 138

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)

A manual is presented for use by state, county, and local organizations in improving their case disposition process for persons arrested for drunk driving. This process combines the public health system, which attempts to prevent and treat the underlying drinking problem, and the traffic law system, which uses punishment and the threat of punishment to deter drinking/driving. System-level information is presented on case disposition aspects of health/legal systems and on interaction of case disposition elements (e.g. courts and probation departments) with other elements (e.g. treatment agencies). Information sources are indicated for more detailed design of specific components of the disposition process (e.g. presentence investigation). General principles of health/legal systems are described, and detailed descriptions and assessments of generic types of systems now operating are presented (reduced charge, probation, reduced sentence, and administrative). Methods are outlined for developing an analytic description of a jurisdiction's health/legal system as a design tool. A three-step method for designing systems improvements is described and illustrated with examples drawn from the experience of current health/legal systems. An introduction to program evaluation as applied to health/legal systems is provided as well as an extensive bibliography. Appended are a description of the approach used to collect descriptive data about operating health/legal systems, some findings derived from the data, and summary descriptions of ten representative systems which were visited and observed; also appended are forms for use in developing a system description, and a list of the alcohol program coordination agency in each state.

by Ralph K. Jones; Kent B. Joscelyn; John W. McNair
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
DOT-HS-7-01812
Rept. No. UM-HSRI-79-55 ; 1979 ; 428p 314refs
Rept. for Oct 1977-Aug 1979.
Availability: NTIS

HS-805 139

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT

Questionnaires were distributed to members of the International Brotherhood of Teamsters (IBT) and the Professional Drivers Council (PROD) to obtain attitudinal information from these drivers of heavy-duty tractor trailers concerning ride quality and safety and to assess the interrelationships among driver biographical, health, and truck profiles as they affect comfort, safety, and ride quality. Over 36% of the IBT drivers (3608 of whom responded) and 52% of the PROD drivers (299 of whom responded) stated that they experienced "problems which cause major discomfort during normal operations or problems which make it almost impossible to drive the truck." Tractor make was found to have an important impact on ride comfort, two makes being outstanding in terms of comfort and driver preference. Other factors having an important effect on ride comfort are tire type, fifth wheel type, rear suspension, trailer configuration, shocks, seat adjustments, and trailer type. Strong linear relationships were found between riding comfort and the following health and vibrational variables: state of health, experience of fatigue, relationship of health problems to driver comfort, awareness of vibration, kind of vibration observed, and vibration awareness with truck loaded or empty. Driver weight, height, or sex; single vs. sleeper operations; and driving in the East vs. the West were not found to be importantly related to driver comfort. Middle-aged drivers appeared to be more dissatisfied with ride quality than were younger or older drivers. Owners of trucks reported more satisfaction with ride quality than did drivers of company trucks.

by Linda J. Wilson; Theodore W. Horner
Wilson-Hill Associates, Inc., 1025 15th St., N.W., Suite 700, Washington, D.C. 20005
DOT-HS-8-02037; SB3-4-0-8(A)-78-C-1178
1979 ; 160p 31refs
Availability: NTIS

HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT

by R. D. Ervin; R. L. Nisonger; C. Mallikarjunarao; T. D. Gillespie
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
DOT-HS-7-01602
Rept. No. UM-HSRI-79-21-1 ; 1979 ; 23p
Rept. for May 1977-Apr 1979. For abstract, see HS-805 141.
Availability: NTIS

HS-805 141

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT

The yaw stability of tractor-semitrailers in steering-only maneuvers is examined by means of computer simulation and full-scale tests. The tests were conducted on as-designed vehicles as well as vehicles modified with frame and front suspension stiffening elements. Results show that while tractor yaw instability can occur well below the rollover threshold for certain vehicles, modified stiffness parameters can eliminate such premature yaw instability. Computerized simulation study of the influence of design and operating variables on tractor yaw stability served to classify the relative importance of different suspension stiffness options, as well as tire mix, fifth wheel placement, and trailer loading practices. Results show that remarkably low levels of tractor yaw stability are possible with certain combinations of design and in-use variables. A set of measurements of tractor-semitrailer ride vibrations is also reported as an add-on task.

by R. D. Ervin; R. L. Nisonger; C. Mallikarjunarao; T. D. Gillespie
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
DOT-HS-7-01602
Rept. No. UM-HSRI-79-21-2 ; 1979 ; 150p 18refs
Rept. for May 1977-Apr. 1979.
Availability: NTIS

HS-805 143

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT

An investigation was made to determine whether the incidence of multi-vehicle motorcycle crashes might be reduced by improving the conspicuity of the motorcycle-driver unit. An analysis of Hwy. Safety Res. Inst. data files (a sample of about 10,000 motorcycle crashes in Texas in 1975, and a like-sized sample of car accidents for the same state and period), and a review of several other published analyses of motorcycle accidents clearly showed the overinvolvement of motorcycles (relative to cars and trucks) in accidents in which the other vehicle is executing a maneuver (generally a left turn) across their path. More than 30 conspicuity treatments were developed and demonstrated for subjective appraisal. A sample of countermeasures was evaluated in the field by means of a gap-acceptance procedure in which traffic conditions were normal and car drivers were unaware of their study participation. Results indicate that daytime conspicuity can most effectively be improved by use of fluorescent garments or steady or modulating lights. Nighttime conspicuity seems to be aided by use of retroreflective garments and running lights. All items found to produce significant conspicuity effects were found to be cost-beneficial. Limited tests with mopeds indicated that automobile drivers' responses were much different from their responses to motorcycles. Results suggested that the use of a fluorescent flag would be beneficial for mopeds.

by P. L. Olson; R. Halstead-Nussloch; M. Sivak
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-HS-6-01459
Rept. No. UM-HSRI-79-76 ; 1979 ; 145p 118refs
Rept. for 16 Aug 1976-30 Jun 1979.
Availability: NTIS

HS-805 144

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT

Recruitment requirements, enrollment techniques, and membership characteristics are described for independent repair facilities involved in the National Parts Return Program (PRP), which solicits the voluntary submittal of failed automotive components and information by independent auto repair shops, new car dealers, high-mileage fleets, and automotive parts suppliers. Program members submit actual failed parts or failure information to the National Hwy. Traffic Safety Administration via Kappa Systems, Inc. (KSI). The three major operational functions of KSI in this program are described: data collection, data management (i.e. parts and information processing, failure analysis, updating manual and automated files, producing monthly reports), and production of the PRP Newsletter. Data are analyzed which were submitted by the PRP membership during the contract year covering 1 Jul 1978 through 30 Jun 1979, as well as for CY 1976-CY 1978. Results are discussed in terms of three related parameters measuring program effectiveness: quantity of part or information inputs; percentage of enrollees that were "active," or activity level; and number of inputs per active shop ratio, or activity rate. The review initially centers on contributions received from the total membership, and then focuses on regional activity levels and rates of independent repair shops. Actual parts returned continued to decrease, but information inputs rose markedly during the past contract year. Repair shop regional activity level decreased from CY 1976 to CY 1978 but increased in CY 1979; activity rates decreased over the entire four-year period. Recommendations to improve PRP effectiveness during CY 1980 include: to gather more information about new members, to initiate a two-state enrollment campaign, and to enhance the incentive program.

by M. Lowery; P. Karawanny; B. Miller; R. Recard
Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
DOT-HS-6-01433
Rept. No. KAPPA-DOT-79-01 ; 1979 ; 106p
Rept. for 1 Jul 1978-30 Jun 1979. Vol. 2 is HS-805 145; Vol. 3 is HS-805 146.
Availability: NTIS

HS-805 147

FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT

Innovative methods are described to be used as a substitute for a specific funding mechanism by a state or local government planner or private entrepreneur to obtain funds from currently available sources in order to initiate a motor vehicle diagnostic inspection program. Public and private financing are addressed to correspond with the two basic administrative organizational approaches to the various inspection concepts. State and local government funding mechanisms include Federal domestic assistance and state- and locally-generated revenues. A description of these mechanisms is followed by that of the spectrum of funding mechanisms, including commercial banks and capital investment firms, applicable to private, for-profit and nonprofit enterprises such as cooperatives and auto service clubs. A set of matrices are presented which show for the public and private sectors the funding options that are appropriate for each of the diagnostic inspection program concepts. It is indicated that although no single funding mechanism is best suited for a particular inspection concept, with the exception of the Cooperative Bank, it is possible to tailor several funding mechanisms to fit a given inspection program concept. A glossary of financial terms is appended.

by H. William Nordyke; Charles Henderson
Nordyke and Associates, Ltd., 8027 Leesburg Pike, Vienna, Va. 22180
NHTSA-9-6691
1979 ; 81p 6refs
Rept. for Aug-Oct 1979.
Availability: NTIS

HS-805 148

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT

Four regional workshops were conducted, addressing the National Maximum Speed Limit (NMSL) and highway safety programs. The attendees included the chief administrators and field commanders of state law enforcement agencies. The workshops accomplished four major objectives: to keep law enforcement administrators abreast of federal programs impacting on police traffic services, including the 55 NMSL, and to review the National Hwy. Traffic Safety Administration's (NHTSA) programs and research activities; to enable state law enforcement administrators to identify for NHTSA key problem areas in the delivery of police traffic services in order to provide direction for future NHTSA research efforts; to review the Highway Safety Act of 1978 and attendant Federal regulations as they impact on police traffic services, including the NMSL; and to provide a forum for the participants for the exchange of ideas, mutual support, and regional planning for improvement in the delivery of police traffic services. Recommendations covered various aspects of State/Federal relationships, highway safety programs, and combined efforts for NMSL enforcement. The following findings were among those most frequently mentioned at the workshops. Highway safety programs other than the 55 mph NMSL enforcement suffer because of the Federal emphasis on the NMSL. Various methods are being considered for energy conservation, including fixed post (usually 15 minutes per hour), reducing administrative use of vehicles, two-man patrol cars, etc. Average speeds are still above 55 mph. Because of budgetary reductions, highway safety programs and/or personnel have been cut, leading to enforcement problems on secondary roadways. One solution might be to coordinate activities with the sheriff's department. Both stationary and moving radar have increasingly been employed in speed enforcement efforts. Not all states are receiving legislative support at the state level for their 55 NMSL enforcement efforts. Specific reports on the four workshops are appended.

by Ronald H. Sostkowski; Roberta C. Thompson
International Assoc. of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760
DOT-HS-6-01345-Mod-8
1979 ; 53p
Rept. for Mar-Sep 1979.
Availability: NTIS

HS-805 149

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT

Various National Maximum Speed Limit (NMSL) patrol configurations (combinations of police personnel, equipment and assigned responsibilities) were evaluated to determine their relative productivity (NMSL violators contacted per manhour expended on NMSL enforcement), cost effectiveness (net revenue from NMSL violators fined per NMSL violator contacted) and effect on NMSL compliance on selected highways in six states (selected for geographical distribution and with state law enforcement agencies among which all of the selected enforcement configurations would be employed under controlled conditions). Objectives were to determine if productivity rises as the visibility of the patrol unit is decreased (marked patrol car to unmarked patrol car or aircraft); if productivity rises as the number and sophistication of speed measuring devices are increased (speedometer only, stopwatch, moving radar, stopwatch and moving radar); and the effects of these variables on NMSL compliance. It was found that decreasing patrol unit visibility increased productivity, as did increasing the number and sophistication of speed detection devices. Four apprehending officers working with one officer in an unmarked stationary radar equipped detecting unit is the most cost effective NMSL enforcement configuration evaluated in terms of potential net income per contact. The single officer unmarked car unit equipped with a moving radar in addition to the speedometer has the highest productivity of all patrol configurations evaluated. Lowering visibility and increasing the availability of speed detecting devices increased apprehension of passenger car violators equipped with CB radios but not of commercial driver violators. A statistically significant relationship between enforcement operations and NMSL compliance was not shown in the data collected. Extensive data are provided in tables and charts; evaluation plans and details are appended.

by Norman Darwick; Ronald H. Sostkowski; Arthur V. Smith, Jr.
International Assoc. of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760
DOT-HS-6-01345
1978 ; 256p
Rept. for Aug 1977-Dec 1978.
Availability: NTIS

HS-805 150

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT

Information is provided for law enforcement administrators and other decision makers on the various enforcement practices and procedures utilized by states' law enforcement agencies to enforce the 55 mph national maximum speed limit (NMSL). During Phase 1 of this project, 43 state law enforcement agencies completed and returned a resource document which provided information concerning their NMSL enforcement practices and resources, and site visits were conducted in ten states to observe NMSL enforcement operations. During Phase 2, the cost effectiveness and benefits of various enforcement configurations were evaluated with the cooperation of the following six state agencies: Arizona Dept. of Public Safety, Colorado State Patrol, Iowa Dept. of Public Safety, Maryland State Police, Massachusetts Dept. of Public Safety, and Ohio State Hwy. Patrol. Evaluated were patrol configurations (single unit up to 5-unit); marked and unmarked patrol cars, and aircraft; and speedometers, moving and stationary radars, and stopwatches. Recommendations include reducing the visibility of vehicles used in NMSL enforcement, and increasing the availability of moving radar and stopwatches to officers for detecting and measuring violator speeds.

by Norman Darwick; Ronald H. Sostkowski; Arthur V. Smith, Jr.
International Assoc. of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760
DOT-HS-6-01345
1979 ; 155p
Rept. for Dec 1978-Jun 1979.
Availability: NTIS

HS-805 151

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY

National Crash Severity Study (NCSS) and Opinion Res. Corp. (ORC) data collection methods are examined as they relate to the differences in the rates of restraint usage reported by the two sources. It is found that if a similar portion of the NCSS file is considered (drivers of 1964 through 1978 model year passenger cars in urban areas) and is then adjusted to the distribution of model years observed by ORC, the estimate of usage for NCSS is 13.8% vs. 14.1% for ORC. This does not support the widely-held view that the accident-involved population differs significantly from the overall driving population in seat belt usage rates. An examination of the entire NCSS file indicates that certain groups apparently have higher usage rates: females, people over 24 years old, those in smaller or newer cars, those involved in urban accidents, and those who have suffered less severe injuries. Restraint effectiveness estimates based on NCSS data show that the lap and shoulder restraint system occupants suffered over 60% fewer serious injuries than did unrestrained occupants, and that lap-belted occupants had over 40% fewer serious injuries than unrestrained occupants. Over 50% and over 20% fewer fatalities were found, respectively, for lap/shoulder-restrained and lap-belted occupants vs. unrestrained occupants. It is concluded that NCSS data seem generally consistent with ORC data, and with those from the Fatal Accident Reporting System, and the Restraint System Evaluation Program, for estimates of restraint usage and effectiveness. NCSS data provide greater detail, particularly for occupants suffering serious trauma.

by Susan C. Partyka
National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
1979 ; 34p 5refs
Availability: Corporate author

HS-810 353

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979

The National Hwy. Traffic Safety Administration's (NHTSA) role in increasing voluntary compliance with the 55 mph national speed limit is addressed. The Surface Transportation Assistance Act requires the states to submit annually to the Secretary of Transportation data on the percentage of motor vehicles exceeding 55 mph for the 12-month period ending 30 Sep. The graduated compliance standards require no less than 30% compliance by the end of FY 1979, to no less than 70% compliance by the end of FY 1983 and for each year thereafter. The law requires total vehicle monitoring with Federal-aid highway funding dependent on compliance. Federal funding has been authorized for state 55 mph enforcement programs and for incentive grants to states exceeding the mandated criteria by more than 10%. NHTSA is assisting states in improving their 55 mph compliance programs and in increasing public support. In 1978, NHTSA conducted regional workshops in Washington D.C., Atlanta, Kansas City, and San Francisco to assist state officials involved in 55 mph public education programs. A model plan for managing 55 mph public communication programs has been provided to states. The Dept. of Transportation is developing a new national public service advertising campaign on 55. NHTSA is focusing its media efforts on operation C.A.R.E. (Combined Accident Reduction Effort), a cooperative campaign of state law enforcement agencies working together to enforce the 55 mph speed limit and other safety laws on major interstate routes during Memorial Day, July 4th, and Labor Day weekends. NHTSA is contacting businesses, associations, and public interest groups in an effort to develop grass-roots support for 55. NHTSA's basic strategy for promoting voluntary compliance involves cooperative efforts between business and community health and safety organizations.

by Howard Dugoff
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 10p
Availability: Corporate author

best copy available

HS-900 031

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE

This four-unit course for training emergency medical services instructors consists of a sound/slide presentation and a student workbook. The presentation may be viewed by a group or individually. The four units include preparing to teach the EMT (emergency medical technician) course; developing EMT knowledge and skills; using training aids; and evaluating EMT knowledge and skills. A synopsis of each unit is presented, followed by statements to be completed during the presentation, and an application section containing questions to test knowledge after the presentation. Correct answers to questions and statements are provided in the back of the workbook. While having competence in the subject matter is vitally important, to be effective the instructor must be totally familiar with the structure of the course and competent in aiding each student to reach the course objectives. This instructor training course was developed to help the instructor attain these objectives and to prepare him to teach emergency medical care more effectively.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 27p 2refs
Clearinghouse Training Materials. Subject: Emergency Services. Format: Student Manual. Type of Audience: Emergency Medical Instructors.
Availability: GPO, stock no. 050-003-00351-4

INDEX to ABSTRACTS

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KWOC Title Index

ABSORBING

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

ABUSE

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

ACCELERATION

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

ACOUSTICAL

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

ACRS

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

ACTIONS

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

ADAPTS

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

ADDICTED

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?
HS-027 604

ADHESIVES

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING
HS-026 395

ADJUDICATION

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

ADMINISTRATIVE

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

ADMINISTRATOR

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

ADULTS

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS
HS-027 615

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS
HS-027 612

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

ADVISORY

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

AERODYNAMIC

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 079

AID

HOW SAFE ARE FEDERAL-AID HIGHWAYS?
HS-026 424

AIR

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION
HS-027 547

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT

SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

ALCOHOL

A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT
HS-027 619

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS
HS-027 612

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS
HS-027 608

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

ALCOHOLICS

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

ALCOHOLISM

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

ALGORITHM

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

ALIVE

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

ANALYSES

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

ANALYST

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

ANALYTICAL

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: I. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

ANGULAR

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

ANTHROPOMORPHIC

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

ANTILOCK

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

APPLIED

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

ART

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978
HS-026 415

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

ARTICULATED

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

SSEMBLY

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

SSESS

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

ASSESSMENT

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

ASSESSMENTS

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

ASSOCIATED

MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

AUTO

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

AUTOMATIC

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

AUTOMOBILE

EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

AUTOMOTIVE

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 064

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 2: FINAL REPORT
HS-805 065

AVERAGE

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

AVOIDANCE

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

AXIS

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

BAC

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

BALTIMORE

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

BARRIER

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

BASELINE

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

BASES

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

BATTERY

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978
HS-026 415

BEHAVIOR

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

BEHAVIORS

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

BELT

GENERAL SAFETY BELT USAGE. ISSUE PAPER
HS-803 824

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS
HS-027 521

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS
HS-027 523

BELTS

SEAT BELTS: 1949-1956. FINAL REPORT.
HS-803 911

BENEFITS

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

BICYCLE

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PRO-

GRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

BIKE
TUNE UP YOUR BIKE FOR RIDING EASE AND SAFETY
HS-026 425

BIODYNAMICS
BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

BIOMECHANICAL
MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

BLOOD
THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

BODY
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

BOLTS
FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING
HS-026 395

BRAIN
ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

BRAKE
EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

BRAKING
CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

BREATH
ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

BUS
TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS
HS-027 537

CADAVERIC
THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

CAL
SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

CALIBRATION
CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

CALIFORNIA
STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

CAMPAIGNS
SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

CANNABINOIDS
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

CAR
CAR SEAT SAFETY--PAST, PRESENT, AND FUTURE
HS-027 532

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

CARS

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

CASE

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

CASES

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

CASUAL

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

CATALOG

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

CATALYTIC

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

CAUSATION

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

CAUSES

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 099

CELL

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

CEREBRAL

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

CHARACTERISTICS

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

CHARACTERIZATION

CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

CHARACTERIZING

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE

THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

CHEMICAL

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS
HS-027 615

CHEST

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

CHILD

CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

CHILD RESTRAINTS. ISSUE PAPER
HS-803 819

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES
HS-027 533

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

CHILDHOOD

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS
HS-027 531

CLASS

THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

COLLISION

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

COLLISIONS

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

COLUMN

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

COMFORT

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

COMMERCIAL

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS
HS-027 521

COMPACT

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER
HS-803 820

COMPARISON

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

COMPARISONS

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

COMPATIBILITY

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

COMPONENTS

OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

COMPUTER

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT
HS-804 913

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

CONCENTRATION

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

CONCEPTS

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

CONFERENCE

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

CONFIGURATIONS

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

CONFIRM

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

CONFRONTS

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

CONSENT

AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

CONSPICUITY

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

CONTINUOUSLY

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

CONTROLS

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

CONTUSION

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

CONVENIENCE

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

CONVERTER

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

CORNERING

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

CORPORATE

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

CORRELATION

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

COST

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

COUN

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

COUNCIL

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

COUNTERMEASURE

THE CLASS THAT WAS DESIGNED TO TEACH EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

COUNTERMEASURES

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

COUNTY

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

COURSE

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE
HS-900 031

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

COVERAGE

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

CRASH

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

CRIMINAL

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

CRITERIA

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

CROSSING

URBAN CROSSING PROBLEMS. FINAL REPORT
HS-805 127

CUSHION

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION
HS-027 547

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

CYLINDER

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

DEBATE

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

DECELERATION

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

DECISION

THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

DEFECTS

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

DEFENSIVE

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

DEFICIENT

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCI-

DENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

DEFLECTION

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

DEFLECTIONS

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

DEGREE

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

DELPHI

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

DEPARTMENT

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

DEPENDENCY

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS
HS-027 615

DESIGN

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

SEAT DESIGN–A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS
HS-027 523

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT
HS-804 340

DESIGNING

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

DETECTION

THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED
HS-027 609

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

DEVELOPING

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

DEVICES

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

DIAGNOSTIC

FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

DIAZEPAM

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

DIESEL

A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM
HS-026 398

DIFFERENTIAL

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

DISPLACEMENT

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

DISTRIBUTION

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

DISTURBANCE

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 079

DPMAS

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

DRAWBAR

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

DRINKING

DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

DRIVER

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION
HS-027 547

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

DRIVER LICENSING. REV. ED.
HS-805 043

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?
HS-027 604

THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

DRIVERS

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

DRIVETRAIN

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

DRIVING

AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED
HS-027 609

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

DRUG

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

DRUNK

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

DUMMIES

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

DUMMY

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

DUTY

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

DWI

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

DYNAMICS

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 2, FINAL TECHNICAL REPORT
HS-804 911

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT
HS-804 913

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

DYNAMICS OF WHEELED RECREATIONAL VEHICLES
HS-026 402

EASE

TUNE UP YOUR BIKE FOR RIDING EASE AND SAFETY
HS-026 425

EASY

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS
HS-026 394

ECONOMIC

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

ECONOMY

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

EDDY

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

EDUCATION

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

EFFECTIVENESS

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS
HS-027 523

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

ELECTRIC

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978
HS-026 415

ELECTRO

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

ELEMENT

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

EMERGENCY

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE
HS-900 031

EMISSIONS

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

ENERGY

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

ENFORCEMENT

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

ENGINEER

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

EPIDEMIOLOGY

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS
HS-027 531

EQUIPMENT

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

EQUIPPED

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

EQUIVALENT

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

ERRORS

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

ESTABLISHMENT

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

ESTES

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

ESTIMATES

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

ESTIMATION

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

ETOBICOKE

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

EVALUATED

DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

EVALUATION

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS
HS-027 612

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS
HS-027 550

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTI-LOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 07

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 60

EVOLVING

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

EXAMINATION

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

EXECUTIVE

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT
HS-804 094

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 099

EXPERIMENTAL

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

EXPOSURE

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

FABRICATION

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

FACILITIES

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

FAMILY

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)
HS-026 423

FARS

FARS, FATAL ACCIDENT REPORTING SYSTEM, 1978 ANNUAL REPORT
HS-804 832

FASTENERS

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING
HS-026 395

FATAL

FARS, FATAL ACCIDENT REPORTING SYSTEM, 1978 ANNUAL REPORT
HS-804 832

FATALITIES

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

FEASIBILITY

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

FEDERAL

HOW SAFE ARE FEDERAL-AID HIGHWAYS?
HS-026 424

FEMORAL

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

FIBER

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

FIELD

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

FINANCING

FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

FINES

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS

HS-027 600

FLEXIBILITY

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES

HS-026 405

FLUIDS

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT

HS-804 009

FLUOROMETRY

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT

HS-804 009

FMVSS

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT

HS-805 135

FOCUS

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING

HS-026 395

FOREIGN

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979

HS-804 472

FREEWAY

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

HS-026 413

FREEWAYS

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL

HS-026 421

FREQUENCY

OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)

HS-804 723

FRONT

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS

HS-027 548

FRONTAL

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS

HS-027 528

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION

HS-027 540

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS

HS-027 550

FRONTS

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS

HS-027 534

FUEL

A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM

HS-026 398

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT

HS-026 426

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT

HS-803 720

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT

HS-803 856

FULLY

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS

HS-027 522

GAGE

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT

HS-805 124

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT

HS-805 123

GEORGE

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER

HS-027 613

GRADED

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY

HS-027 539

GRAPHITE

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE

HS-026 391

GROSS

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

GUIDE

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

GX

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

HANDBOOK

OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

HANDLING

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 2, FINAL TECHNICAL REPORT
HS-804 911

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT
HS-804 913

MOTORCYCLE HANDLING. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 190

MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-804 191

HARD

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS
HS-026 394

HEAD

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

HEADWAY

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

HEADWAYS

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

HEALTH

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

HEAVY

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

HELMET

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS
HS-026 394

HEMISECTION

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

HIGHWAY

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES
HS-027 533

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS
HS-027 608

HIGHWAYS
HOW SAFE ARE FEDERAL-AID HIGHWAYS?
HS-026 424

HILTON
REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

HISTORIES
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

HITCHPOINT
EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY
HS-026 404

HONEST
AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

HOTEL
REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

HUMAN
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS
HS-027 550

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

HYDRAULIC
LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

HYDROSTATIC
PURELY HYDROSTATIC HIGH RATIO TRANSMISSION
HS-026 390

HYPOTHESIS
TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

IDEAS
REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

IDENTIFICATION
DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

ILLEGAL
ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

ILLITERATE
THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

IMPACT
BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

IMPACTS

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS
HS-027 550

IMPAIRED

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

IMPALA

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

IMPLEMENTATION

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

IMPLIED

AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

IMPROVE

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

IMPROVEMENT

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

IMPROVEMENTS

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

INCIDENT

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

INCREASING

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

INDEPENDENT

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

INDUCED

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

INFLATABLE

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

INFLATING

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION
HS-027 547

INFLUENCES

POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

INFORMATION

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

INJECTION

A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM
HS-026 398

INJURIES

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

INJURY

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS
HS-027 522

MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

INNOVATION

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

INPUT

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

INSPECTION

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

INSTRUCTOR

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE
HS-900 031

INTEGRATED
PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS
HS-027 521

INTEGRATION
CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

INTERACTION
CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

INTERACTIONS
A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION
HS-027 547

INTERIM
FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

INTERPRETED
CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

INTERVENTION
JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

INTOXICATED
AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED
HS-027 609

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

INTRACRANIAL
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

INVESTIGATION
INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

INVESTIGATORS
FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

INVOLVEMENT
REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

ISSUE
ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

CHILD RESTRAINTS. ISSUE PAPER
HS-803 819

GENERAL SAFETY BELT USAGE. ISSUE PAPER
HS-803 824

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER
HS-803 820

URBAN PEDESTRIAN SAFETY. ISSUE PAPER
HS-803 825

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

ISSUES

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

JAIL

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

JERSEY

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

JOINT

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

JUDGE

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

JUDICIAL

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

JUSTICE

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

KNEE

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

LABORATORY

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

LARGE

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

LATENT

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

LATERAL

EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY
HS-026 404

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

LAW

AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?
HS-027 604

LAWS

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS
HS-026 394

STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS
HS-804 549

LEGAL

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

LEGISLATION

OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

LEGISLATORS

SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS
HS-027 608

LEHRER

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

LEVEL

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 099

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

LICENSING

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

DRIVER LICENSING. REV. ED.
HS-805 043

STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS
HS-804 549

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

LIFE

LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

LIGHTING

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

LIMIT

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

LITERATURE

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

LIVING

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

LOAD

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

LOADINGS

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

LOADS

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

LOBES

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

LOCAL

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS
HS-027 608

LONG

LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

LOW

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

MAC

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

MACROSCOPIC

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

MAINTENANCE

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

MANAGEMENT

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

MANDATED

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

MANEUVER

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT
HS-804 094

MANUAL

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

MANUFACTURER

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

MANUFACTURERS

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

MANUFACTURING

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

MARYLAND

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

MASS

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

MASTER

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

MATERIAL

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 064

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 2: FINAL REPORT
HS-805 065

MATERIALS

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS
HS-027 537

MATHEMATICAL

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

MAXIMUM

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

MEASURED

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

MEASUREMENT

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

MECHANISMS

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS
HS-027 522

MEDICAL

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE
HS-900 031

MEDICINE

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?
HS-027 604

METER

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

METHODOLOGICAL

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

METHODOLOGY

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

METHODS

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

MINIBIKE

MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

MINORS

STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS
HS-804 549

MISSING

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

MODEL

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

MODELS

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

MODIFICATION

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

MODIFIED

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

MODULATION

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

MODULE

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

MONITORING

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT
HS-805 124

MONKEY

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

MONTH

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

MOPED

MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

MOPEDS

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

MOTOR

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS
HS-027 531

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

MOTORCYCLE

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 2, FINAL TECHNICAL REPORT
HS-804 911

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT
HS-804 913

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS
HS-026 394

MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

MOTORCYCLE HANDLING. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 190

MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-804 191

MOTORCYCLES

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

MOUNT

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

MPH

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTI-

MORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

MTF

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

MULLARD

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

MULTIDISCIPLINARY

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

NATIONAL

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES
HS-027 533

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

NCA

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

NDR

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

NDT

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

NEDS

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

NEIL

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

NETWORK

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT

HS-026 393

NHTSA

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)

HS-027 536

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES

HS-027 533

NMSL

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT

HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT

HS-805 149

NOISE

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT

HS-804 354

NONCONTACT

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT

HS-805 124

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT

HS-805 123

NONDESTRUCTIVE

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT

HS-805 034

NONRESIDENT

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER

HS-803 820

NUMBER

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3

HS-804 785

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1

HS-804 784

NUTS

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING

HS-026 395

OCCUPANT

OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT

HS-804 780

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL

HS-027 526

OCCUPANTS

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS

HS-027 529

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS

HS-027 522

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS

HS-027 521

OFFENDERS

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)

HS-027 601

OFFENSES

AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)

HS-027 607

OFFICIALS

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS

HS-027 606

OHIO

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT

HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT

HS-026 414

OLDS

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS

HS-804 834

OPTICAL

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT

HS-804 105

OPTIMIZATION

A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM

HS-026 398

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT

HS-804 772

OPTIMUM

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

OPTIONS

FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

ORIENTATION

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

PANORAMA

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

PAPER

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

CHILD RESTRAINTS. ISSUE PAPER
HS-803 819

GENERAL SAFETY BELT USAGE. ISSUE PAPER
HS-803 824

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER
HS-803 820

URBAN PEDESTRIAN SAFETY. ISSUE PAPER
HS-803 825

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

PARAMETER

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

PART

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)
HS-026 423

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

PARTICIPANT

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

PARTS

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

PASSENGER

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

PASSIVE

PASSIVE RESTRAINTS
HS-805 044

PATROL

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

PEDESTRIAN

EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

URBAN PEDESTRIAN SAFETY. ISSUE PAPER
HS-803 825

PEDESTRIANS

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

PEOPLE

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

PERCEPTION

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

PERFORMANCE

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

PERFORMANCES

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

PERIODIC

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

PERSONS

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

PERSPECTIVE

DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

PERTAINING

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

PHENOMENON

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

PILOT

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

PLANE

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

PLASTIC

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

PMVI

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

POISSON

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

POLICE

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

POLICIES

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

PORTABLE

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

POSTURAL

POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

POWERED

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978
HS-026 415

PRACTICES
NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

PREDICTING
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

PRELIMINARY
ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

PRESENTATIONS
REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

PRESIDENT
DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

PRESSURE
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

PREVENTING
TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

PREVENTION
JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

PRINCE
PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

PROBATION
DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

PROBATIONARY
STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS
HS-804 549

PROBLEM
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?
HS-027 604

PROBLEMS
MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

URBAN CROSSING PROBLEMS. FINAL REPORT
HS-805 127

PROCEDURES
CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 079

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

PROCEEDINGS
NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

PROCESS
CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS

WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

PRODUCING
TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

PRODUCTION
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

PROGRAMME
R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

PROJECT
PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

PROJECTIONS
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

PROPONENTS
OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

PROSPECTS
THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

PROTECTED
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

PROTECTION
PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS
HS-027 521

PUBLIC
ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

PUBLISHED
REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

PURELY
PURELY HYDROSTATIC HIGH RATIO TRANSMISSION
HS-026 390

QUALITY
DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

QUANTIFICATION
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

RADAR
55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

RADIO
EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

RAILROAD
RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

RAPID
NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

RATIO
CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

PURELY HYDROSTATIC HIGH RATIO TRANSMISSION
HS-026 390

READING

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

REAR

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

REBUILT

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

RECALL

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

RECEIPTS

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

RECEIVING

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

RECOMMENDATIONS

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

RECOMMENDED

DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

RECREATION

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)
HS-026 423

RECREATIONAL

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)
HS-026 423

CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

DYNAMICS OF WHEELED RECREATIONAL VEHICLES
HS-026 402

OFF-ROAD STABILITY OF RECREATIONAL VEHICLES
HS-026 410

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

REDUCE

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

REDUCING

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

REDUCTION

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

REFERRAL

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

REGION

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

REGIONAL

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

REGISTER

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

REHABILITATION

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

REINFORCED

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

REJECTION

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

RELATIONSHIPS

INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

RELATIVE

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

REPAIR

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

REPEATABILITY

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

REPEATERS

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

RESEARCH

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTI-LOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

RESPONSE

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

RESPONSIBILITY

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

RESTRAINED

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS
HS-027 522

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

RESTRAINT

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

RESTRAINTS

CHILD RESTRAINTS. ISSUE PAPER
HS-803 819

PASSIVE RESTRAINTS
HS-805 044

RESULTS

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

RETARDER

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

RETROFIT

TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS
HS-027 537

RETURN

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

REVIEW

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

RICHMOND

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

RIDE

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

RIDER

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS
HS-026 394

RIDING

TUNE UP YOUR BIKE FOR RIDING EASE AND SAFETY
HS-026 425

RIPOFF

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

RISK

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

ROAD

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

OFF-ROAD STABILITY OF RECREATIONAL VEHICLES
HS-026 410

OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA
HS-026 412

ROADWAY

CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

ROLL

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES

HS-026 405

ROLLOVER

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT

HS-804 094

RV

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)

HS-026 423

SAFE

HOW SAFE ARE FEDERAL-AID HIGHWAYS?

HS-026 424

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT

HS-804 777

SAMPLING

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT

HS-805 102

SANCTIONS

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS

HS-027 600

SCALE

IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)

HS-027 601

SCHOOL

TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS

HS-027 537

SE

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER

HS-803 823

SEAT

CAR SEAT SAFETY--PAST, PRESENT, AND FUTURE

HS-027 532

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS

HS-027 521

SEAT BELTS: 1949-1956. FINAL REPORT.

HS-803 911

SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS

HS-027 523

SECRETARY

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979

HS-026 396

SECURITY

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT

HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT

HS-804 340

SEMI

CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL

HS-026 421

SEMINARS

SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS

HS-027 608

SEMITRAILERS

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT

HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT

HS-805 141

SENIOR

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS

HS-027 612

SERIES

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)

HS-026 423

SERVICE

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT

HS-805 072

SERVICES

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE

HS-900 031

SESSION

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979

HS-804 857

SEVERITY

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS

HS-027 529

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY

HS-805 151

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

SHEAR

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

SHOULDER

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

SIDE

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

SIGNALS

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

SIGNIFICANCE

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

SIGNIFICANT

SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS
HS-027 523

SIMPLIFIED

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

SIMULATED

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

SIMULATION

CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

SIMULATIONS

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

SINGLY

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

SMALL

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

SPECTRUM

OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA
HS-026 412

SPEED

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

SPINE

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

SSOM

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

STABILITY

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY
HS-026 404

OFF-ROAD STABILITY OF RECREATIONAL VEHICLES
HS-026 410

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

STABLE

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON
HS-026 422

STAGED

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

STANDARDS

MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

STAPP

STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

STATES

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

STATISTICIAN

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

STEADY

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

STEER

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

STEERING

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

STIFFNESS

EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY
HS-026 404

STRAINS

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

STRATEGIC

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

STRATEGIES

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

STRATEGY

A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM
HS-026 398

STRUCK

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

STRUCTURAL

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

STRUCTURE

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 064

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 2: FINAL REPORT
HS-805 065

SUBCOMPACT

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

SUBJECT

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

SUBJECTS

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

SUBMARINING

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

SUPPLEMENT

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

SUPPLEMENTAL

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

SUPPORT

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

SURROGATES

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

SURVEILLANCE

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

SURVEY

NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

SURVIVABILITY

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SUSTAINED

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

SYMPOSIUM

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

TABULATIONS

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TASK

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

TEACH

THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

TEACHING

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

TEAM

A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT
HS-027 619

TECHNOLOGY

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

TEMPORAL

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

TERMEASURES

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

TEST

A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 079

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

TESTING

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

TESTS

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS
HS-027 537

THEFT

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT
HS-804 340

THORACIC

POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

TIRE

TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 792

TIRES

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

TOLERANCE

DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS
HS-027 550

TORINO

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

TRACTOR

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

TRAFFIC

A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT
HS-027 619

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS
HS-027 612

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINIS-

TRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES
HS-027 533

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 099

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

TRAILER

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY
HS-026 404

TRAINING

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE
HS-900 031

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

TRANSFER

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

TRANSMISSION

PURELY HYDROSTATIC HIGH RATIO TRANSMISSION
HS-026 390

STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

TRANSMISSIONS

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

TRANSPORT

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTI-LOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

TRAUMA

OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA
HS-026 412

TREADWARE

TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 792

TREATMENT

A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT
HS-027 619

TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

TRENDS

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

TRRL

EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTI-LOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

TRUCK

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT
HS-805 122

TUESDAY

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

TUNE

TUNE UP YOUR BIKE FOR RIDING EASE AND SAFETY
HS-026 425

TURNING

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

UNEMBALMED

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

UNITED

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

UNPROTECTED

INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

URBAN

URBAN CROSSING PROBLEMS. FINAL REPORT
HS-805 127

URBAN PEDESTRIAN SAFETY. ISSUE PAPER
HS-803 825

USAGE

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

GENERAL SAFETY BELT USAGE. ISSUE PAPER
HS-803 824

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

USER

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

UTILITY

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

UTILIZATION

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

VALIDATION

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 792

VALIDITY

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

VARIABLE

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

VEGA

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

VEHICLE

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)
HS-026 423

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT
HS-804 094

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS
HS-027 531

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA
HS-026 412

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW

MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT
HS-804 340

VEHICLES

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)
HS-026 423

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978
HS-026 415

CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

DYNAMICS OF WHEELED RECREATIONAL VEHICLES
HS-026 402

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

OFF-ROAD STABILITY OF RECREATIONAL VEHICLES
HS-026 410

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS
HS-027 521

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

VERY

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

VESSELS

THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

VIOLATION

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

VIOLATOR

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER
HS-803 820

VIRGINIA

A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

VISIBILITY

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

VISUAL

THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED
HS-027 609

VOLARE

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

WEIGHT

FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

WELDING

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING
HS-026 395

WELL

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

WHEEL

CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

WHEELED

DYNAMICS OF WHEELED RECREATIONAL VEHICLES
HS-026 402

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

WORK

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

WORKSHOPS

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

WORLD

FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING
HS-026 395

WRECKER

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

YAW

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

YORK

THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

YOUNG

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS
HS-027 615

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

YOUTH

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS
HS-027 615

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

ZONES
VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES HS-026 416

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Author Index

Abel, Jacob M.
DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

Adams, Hume
DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

Adolph, R. J.
NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

Adomeit, Dieter
SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS
HS-027 523

Alem, Nabih M.
HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

Allen, R. Wade
THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

Allen, Stanley D.
POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

Anstey, L. M.
NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

Appel, Hermann
COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

Ashton, S. J.
SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

Baird, Jack
MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

Balcerak, John C.
MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

Balthazard, M.
MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Banzet, P.
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

Baron, Phyllis
PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

Barrett, M. F.
DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

Baudoin, P.
CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

Baum, A. Stephen
ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

Bayer, Anthony R.
DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

Bennett, Clarke
HOW SAFE ARE FEDERAL-AID HIGHWAYS?
HS-026 424

Benson, Joseph B.
CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

Blatch, P.
NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

Brandt, George D.
THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY

ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS

HS-027 606

Bright, George

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS

HS-027 615

Broadhead, W.

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.

HS-805 054

Bryant, P. J.

DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT

HS-804 009

Buell, W. R.

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT

HS-804 772

Caddy, Glenn R.

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH

HS-027 602

Campbell, B. J.

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT

HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT

HS-804 841

Cantwell, Charles R.

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT

HS-804 127

Carlson, G. C.

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT

HS-026 393

Carlson, William L.

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS

HS-804 834

Castellan, N. John

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT

HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT

HS-805 086

Cedar, Dennis A.

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE

HS-026 391

Ceder, Avishai

STABLE PHASE-PLANE AND CAR-FOLLOWING BEHAVIOR AS APPLIED TO A MACROSCOPIC PHENOMENON

HS-026 422

Cesari, D.

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS

HS-027 550

Charters, A. Crane

OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA

HS-026 412

Cheng, R.

BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION

HS-027 545

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL

HS-027 530

Chi, Michael

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]

HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]

HS-805 084

Coda, Lee A.

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT

HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT

HS-026 414

Comer, Patricia A.

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT

HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT

HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT

HS-804 587

Council, Forrest M.

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT

HS-804 733

Couts, D.

LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT

HS-805 067

Crawford, George

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)

HS-027 603

Culver, Clyde C.

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION

HS-027 547

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS

HS-027 525

Cummings, Joseph

JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)

HS-027 603

Dahl, R. D.

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT

HS-026 393

Danner, Maximilian

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS

HS-027 528

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS

HS-027 527

Darago, Vincent Stephen

REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT

HS-803 658

Darwick, Norman

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT

HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT

HS-805 149

Deal, Richard

NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT

HS-805 072

Delmas, A.

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING

HS-027 544

Denton, R. A.

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL

HS-027 530

Dexter, Daniel

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT

HS-804 791

Doan, Rupert A.

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS

HS-027 606

Dueker, Richard L.

URBAN CROSSING PROBLEMS. FINAL REPORT

HS-805 127

Dugoff, Howard

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979

HS-810 353

Dunipace, K. R.

DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.

HS-804 721

Edmondson, A. J.

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT

HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT

HS-805 126

Edwards, Carl

A RECREATION VEHICLE FOR YOUR FAMILY. PT. 2 OF A TWO-PART SERIES ON RECREATIONAL VEHICLES (RV'S)

HS-026 423

Egberg, Timothy R.

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT

HS-805 074

Egbert, Timothy P.

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA,

STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

Eidemiller, Randolph
OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

Ellingstad, Vernon S.
IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

Enserink, E.
BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

Ervin, R. D.
THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

Faulkner, J. Daniel
THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

Fayon, A.
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Fisher, Franklin G. , Jr.
OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

Flynn, L. , comp.
DRIVER LICENSING. REV. ED.
HS-805 043

Flynn, Lois , comp.
PASSIVE RESTRAINTS
HS-805 044

Foret-Bruno, J. Y.
INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

Gan, O. H. M.
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

Gennarelli, Thomas A.
DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

Gillespie, T. D.
THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

Ginett, Brian J.
THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

Gomberg, Christopher
CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

Got, C.
INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Gott, P. G.
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

Graham, David
DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

Gray, T. A.
THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

Green, Robert E.
ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

Grimm, Ann C. , comp.
ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

Gutshall, P. L.
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

Gyenes, L.
FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

Hagen, Roger E.
TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

Hall, Richard W.
AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

Halstead-Nussloch, R.
DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

Hargroves, Bradley T.
VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

Harris, Douglas H.
THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED
HS-027 609

Harris, Philip S.
A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

Hartemann, F.
INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

Hartman, Bradley S.
REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

Hassler, Craig R.
EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

Henderson, Charles
FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

Henson, S. E.
SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

Hochberg, Y.
ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Hodges, Henry C. , Jr.
NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

Hodges, Henry C.
NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 792

Hodgson, J. W.
CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

Hodgson, V. R.

ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION

HS-027 541

Hofmann, Jens

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS

HS-027 528

Hogge, Jeffrey R.

THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT

HS-803 609

Hogue, Jeffrey R.

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT

HS-805 079

Hontschik, Heinrich

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS

HS-027 521

Horner, Theodore W.

DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT

HS-805 139

Horsch, John D.

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION

HS-027 547

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT

HS-027 524

Howard, Donald F.

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT

HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT

HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT

HS-804 587

Howat, P. A.

EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES

HS-027 611

Howland, John S.

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT

HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT

HS-804 340

Huang, Matthew

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT

HS-804 772

Humann, Kingdon

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT

HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT

HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT

HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT

HS-805 076

Hume, R. D.

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT

HS-805 102

Hume, Rex D.

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT

HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT

HS-804 747

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT

HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT

HS-805 086

Hunter, W. W.

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT

HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT

HS-804 841

Hunter, William W.

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL.

2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

Hurter, D. A.
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

Huston, J. C.
RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

Hutchinson, T. P.
LATENT STRUCTURE MODELS APPLIED TO THE JOINT DISTRIBUTION OF DRIVERS' INJURIES IN ROAD ACCIDENTS
HS-026 399

Hyde, Richard E.
CAR SEAT SAFETY--PAST, PRESENT, AND FUTURE
HS-027 532

Ingard, Uno
RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

Jahnle, Herbert A.
MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 064

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 2: FINAL REPORT
HS-805 065

Joachim, E.-U.
A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM
HS-026 398

Johnson, D. B.
RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES
HS-026 406

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES
HS-026 405

Johnston, James G.
THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

Joksch, H.
ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Jones, Ian S.
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT
HS-804 094

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

Jones, Ralph K.
DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

Joscelyn, Kent B.
DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

Kane, Thomas R.
CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

Karawanny, P.
THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

Katz, N.
NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

Kern, F. J.
DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

Khadilkar, Anil V.
SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

King, A. I.
BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

Kirsh, Nathan
THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

Klein, Richard H.
DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 079

Klingberg, Carl L.
REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

Koch, Kevin D.
TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 792

Korf, Jerry L.
A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

Kramer, Florian
COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

Kroell, Charles K.
POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

Lacey, John H.
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

Lange, Juergen
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

Langwieder, Klaus
COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

Lari, A. Z.
EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

Latchaw, A. J. , comp.
DRIVER LICENSING. REV. ED.
HS-805 043

Leung, Y. C.
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

Levine, R. S.
BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

Liner, Stuart A.
STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS
HS-804 549

Little, Joseph W.
REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

Logan, Albert B.
THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?
HS-027 604

Lowery, M.
THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

Ludtke, Norman F.
IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

Mahurin, Timothy R.
PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

Mairesse, P.
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

Maistrelli, R.
PURELY HYDROSTATIC HIGH RATIO TRANSMISSION
HS-026 390

Mallikarjunarao, C.
THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

Maltha, J.
CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

Man, Guy K.
CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

Mansoor, Y.
LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

Masset, J.
MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Mayer, Richard E.
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

McConnell, Edward J.
TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

McDonald, Stephen T.
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION
HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT
HS-805 097

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING
HS-805 098

McGuire, J.
NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

McKnight, James A.
FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT
HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT
HS-804 747

McNair, John W.
DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

Melvin, J. W.
CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

Melvin, John W.
CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

Meroney, William
STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

Merritt, John O.
DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

Miller, B.
THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT
HS-805 144

Milne, James A.
STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

Mital, N. K.
BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

Mitchell, Deborah A.
A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

Morgan, James A.
RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

Mortimer, R. G.
EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

Mortimer, Rudolf G.
FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

Moskowitz, Herbert
CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

Mueller, Gerald
NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

Naab, Kenneth N.
DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

Nahum, Alan M.
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

Nesbitt, Margaret W.
SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS
HS-027 608

Newton, Robert E.
DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

Nichols, James L.
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

Nickel, Wallace E.
NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

Nisonger, R. L.
THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

Niu, B. H. C.
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

Nocerino, J.
NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

Nocerino, J. T.
NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

Nordyke, H. William
FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

Nusholtz, Guy S.
HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

Ogden, A. G. , comp.
DRIVER LICENSING. REV. ED.
HS-805 043

Oldham, F.
LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

Oldham, Fran
OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

Olson, P. L.
DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

Osofsky, I.
LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

Padgaonkar, Arvind J.
SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

Painters, Mike J.
THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

Pancione, Kathleen L.
MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

Partyka, Susan C.
RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

Passerello, Chris E.
A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

Patel, A.
INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Phillips, Llad
SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

Phillips, Robert O.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

Phillips, Robert O.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

Polisky, Randy J.
DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

Pond, Steven
OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

Pope, Mary E.
POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

Prasad, Priyaranjan
SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

Pritz, Howard B.
EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

Psaltis, P.
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

Raasch, Frank D.
RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

Raasch, Frank
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

Radovich, Vladislav G.
DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

Ramet, M.
EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS
HS-027 550

Ramsay, David B.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

Ramsey, David B.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

Recard, R.

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT

HS-805 144

Reidy, J.

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT

HS-805 102

Reiss, Martin L. , ed.

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT

HS-805 122

Remley, J. Frank

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT

HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT

HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT

HS-804 587

Rezabek, S. E.

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT

HS-804 772

Rice, Roy S.

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT

HS-804 094

Riviere, C.

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT

HS-805 120

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT

HS-805 129

Robe, T. R.

EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY

HS-026 404

Rogers, R. W.

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

HS-026 413

Roland, H. E.

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT

HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT

HS-804 841

Romberg, Robert A.

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY

HS-805 094

Ronan, Larry

SEAT BELTS: 1949-1956. FINAL REPORT.

HS-803 911

Roy, Nancy K.

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT

HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT

HS-026 414

Russo, Pearl K.

EASY RIDER--HARD FACTS: MOTORCYCLE HELMET LAWS

HS-026 394

Ruter, Gert

PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS

HS-027 521

Salutin, Lorne

R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING

HS-027 610

Salzberg, Philip M.

REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT

HS-804 777

Sanderson, Glenn A.

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT

HS-804 105

Saunders, David N.

DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA

HS-027 616

Scheffer, W. Patrick

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY

HS-027 618

Scherz, Robert G.

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS

HS-027 531

Schmelzing, Walter
COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

Schnapp, John B.
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

Schneider, Dennis C.
RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

Schroedl, Gregory
OFF-ROAD VEHICLE ACCIDENTS: A NEW SPECTRUM OF TRAUMA
HS-026 412

Schubert, John
TUNE UP YOUR BIKE FOR RIDING EASE AND SAFETY
HS-026 425

Schwartz, Stephen H.
THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

Schwarz, R.
ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 2, FINAL TECHNICAL REPORT
HS-804 911

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT
HS-804 913

Seaver, W. Burleigh
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

Segal, David J.
DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT
HS-804 094

Sellars, Frederick M.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

Seltzer, Merlyn L.
DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

Shanelaris, Peter J.
PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

Shanks, J. E.
INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS
HS-027 522

Shinar, D.
ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Shinar, David
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

Shoemaker, Norris E.
RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

Sieracki, Gerald
NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

Sivak, M.
DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

Smith, Arthur V., Jr.
ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

Smith, Marie
HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

Smith, Randall
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

Smith, Randall W.
THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

Snyder, Thomas P.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

Sostkowski, Ronald H.
ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT
HS-805 150

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT
HS-805 149

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

Squires, M. L.
ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Stalnaker, R. L.
CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Stansifer, Rickey L.
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

States, John D.
MOPED, MINIBIKE, AND MOTORCYCLE ACCIDENTS. ASSOCIATED INJURY PROBLEMS
HS-026 392

Stein, Anthony C.
THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

Stephenson, R. Rhoads
NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES
HS-027 533

Stewart, J. R.
INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

Stewart, J. Richard
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUN- TERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

Stone, D. B.
EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

Strauss, A. M.
OFF-ROAD STABILITY OF RECREATIONAL VEHICLES
HS-026 410

Strickler, J. D.
NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

Strother, C. E.
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

Strother, C.
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE

EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

Struckman-Johnson, David L.
IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

Stubing, P. R.
EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

Stutts, Jane C.
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

Suchors, Cheryl R.
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

Szostak, Henry T.
DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

Tannahill, W. J. , comp.
DRIVER LICENSING. REV. ED.
HS-805 043

Tarriere, C.
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Taylor, Theodore , Jr.
IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

Teper, Gary L.
MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-804 191

Thomas, C.
INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

Thomas, L. M.
ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

Thompson, A. L.
INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS
HS-027 522

Thompson, Roberta C.
NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT
HS-805 148

Treat, J.
ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Treat, John R.
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 099

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY
HS-805 094

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT
HS-805 087

Tucker, John R.
CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

Tumbas, Nicholas S.
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT
HS-805 085
TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT
HS-805 086

Turner, Wendall
PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

Urbanek, G. L.
ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

Valentine, J. L.
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

Van Leeuwen, Jan-Hendrik
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586
CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

Viano, David C.
PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525
POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

Vingilis, Evelyn
R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

Vlasak, Donna L.
EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

Voas, Robert B.
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

Wachter, Wilhelm
INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

Wagner, R.
A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

Walfisch, G.
MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Walker, Judy
CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

Walton, Catherine
A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT
HS-027 619

Ward, Carley
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

Warner, Charles Y.
POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

Wasielewski, Paul
CAR-FOLLOWING HEADWAYS ON FREEWAYS INTERPRETED BY THE SEMI-POISSON HEADWAY DISTRIBUTION MODEL
HS-026 421

Weir, David H.
EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTILOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192
MOTORCYCLE HANDLING. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 190
MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-804 191

Weis, Edmund B. , Jr.
EXPERIMENTAL AUTOMOBILE-PEDESTRIAN INJURIES
HS-026 411

Wessel, W. G.
A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM
HS-026 398

Whitbeck, Carolyn C.
THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

Whorf, Robert P.
MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

Wili, Gerald T.
THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

Williams, Rickey L.
TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

Wilson, Linda J.
DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

Wilson, William B.
OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

Winter, Darlene J.
DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS
HS-027 612

Wismans, J.
CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

Wolf, J. D.
DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

Wolf, Randolph J.
EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT
HS-805 123

Wolfe, Arthur C.
DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

Wood, James , 2nd.
NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

Wrigley, Al
FOCUS ON FASTENERS. THE CHANGING WORLD OF NUTS, BOLTS, ADHESIVES AND WELDING
HS-026 395

Yu, David
SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

Zaidel, D.
ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Zellner, John W.
EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTI-LOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

MOTORCYCLE HANDLING. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 190

MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-804 191

Zimmerman, Roger M.
TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS
HS-027 537

Zinke, D. T.
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

Ziskind, R.
LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

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Corporate Author Index

"Strolee" of California
CAR SEAT SAFETY--PAST, PRESENT, AND FUTURE
HS-027 532

Addiction Res. Foundation, 33 Russell St., Toronto, Ont., Canada
R.I.D.E. (REDUCE IMPAIRED DRIVING IN ETOBICOKE): A PREVENTION PROGRAMME FOR DRINKING DRIVING
HS-027 610

American Probation and Parole Assoc.
DRINKING-DRIVER PROBATION SHOULD BE EVALUATED FROM A PROBATION PERSPECTIVE
HS-027 599

Anacapa Sciences, Inc.
THE VISUAL DETECTION OF DRIVING WHILE INTOXICATED
HS-027 609

Applied Personal Dynamics, Inc., 1144 Union St., San Diego, Calif. 92101
JUDICIAL INTERVENTION: THE MISSING ELEMENT (ALCOHOLISM PREVENTION AND REHABILITATION)
HS-027 603

Applied Science Associates, Inc., Box 158, Valencia, Pa. 16059
URBAN CROSSING PROBLEMS. FINAL REPORT
HS-805 127

Applied Science Associates, Inc., Valencia, Pa. 16059
SEMINARS ON ALCOHOL AND HIGHWAY SAFETY FOR STATE AND LOCAL LEGISLATORS
HS-027 608

Artec, Inc., St. Louis, Mo.
OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140
STUDY AND TEST TO CONFIRM AUTOMOBILE DRIVETRAIN COMPONENTS TO IMPROVE FUEL ECONOMY. VOL. 2. THE DRIVETRAIN DESIGN PROCESS WITH AN AUTOMATIC TRANSMISSION. INTERIM REPORT
HS-803 856

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 339

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN. VOL. 2: FINAL TECHNICAL REPORT
HS-804 340

Association of German Automobile Insurers (HUK-Verband), Dept. of Automotive Engineering, Munich, Germany
INJURIES TO PEDESTRIANS IN REAL ACCIDENTS AND THEIR RELATION TO COLLISION AND CAR CHARACTERISTICS
HS-027 527

COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, La Garenne-Colombes, France
INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Audi NSU Auto Union A.G.
A 30 MPH FRONT/REAR CRASH WITH HUMAN TEST PERSONS
HS-027 548

Battelle-Institut e.V., Frankfurt-am-Main, Federal Republic of Germany
PROTECTION OF OCCUPANTS OF COMMERCIAL VEHICLES BY INTEGRATED SEAT/BELT SYSTEMS
HS-027 521

Brigham Young Univ., Provo, Utah
POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

Budd Co., Technical Center, 375 Commerce Drive, Fort Washington, Pa. 19034
MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 064

MATERIAL APPLICATIONS IN FUTURE AUTOMOTIVE STRUCTURE. VOL. 2: FINAL REPORT
HS-805 065

Burlington Northern, Inc., 176 East 5th St., St. Paul, Minn. 55101
RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT
HS-804 354

California Dept. of Motor Vehicles, Res. and Devel. Section, P.O. Box 1828, Sacramento, Calif. 95809
TRAFFIC SAFETY IMPACT OF MANDATED LICENSING ACTIONS RELATIVE TO ALCOHOL ABUSE TREATMENT PROGRAMS OR FINES AND/OR JAIL SANCTIONS
HS-027 600

Calspan Corp., Advanced Technology Center
DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

FURTHER VALIDATION OF THE SIMULATION MODEL OF AUTOMOBILE COLLISIONS PROGRAM
HS-027 543

Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225

DEVELOPMENT OF VEHICLE ROLLOVER MANEUVER. VOL. 2--EXECUTIVE SUMMARY. FINAL REPORT
HS-804 094

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 2. STAGED COLLISIONS: TESTS NO. 1 THROUGH NO. 5. FINAL REPORT
HS-805 038

RESEARCH INPUT FOR COMPUTER SIMULATION OF AUTOMOBILE COLLISIONS. VOL. 3. STAGED COLLISIONS: TESTS NO. 6 THROUGH NO. 12. FINAL REPORT
HS-805 039

ESTABLISHMENT OF THE REPEATABILITY OF PERFORMANCE OF THE SA103C THREE-YEAR OLD CHILD TEST DUMMIES. FINAL REPORT
HS-805 071

Center for the Environment and Man, Hartford, Conn.

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT
HS-805 102

Chi Associates, Inc., 1011 Arlington Blvd., Suite 316, Arlington, Va. 22209

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 1: SUMMARY FINAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 083

CRITERIA FOR IMPLEMENTATION OF OPTIMUM INTEGRATION ALGORITHM INTO THE WRECKER PROGRAM. VOL. 2: FINAL TECHNICAL REPORT [VEHICLE STRUCTURAL DYNAMICS]
HS-805 084

Chilton Co., 1 Chilton Way, Radnor, Pa. 19089

STATE PMVI (PERIODIC MOTOR VEHICLE INSPECTION) PROGRAM EVALUATION. FINAL REPORT
HS-804 127

City Court Probation and Diversion, Memphis, Tenn.

A TEAM APPROACH TO TRAFFIC SAFETY AND ALCOHOL TREATMENT
HS-027 619

Columbia Univ., Teacher's Coll., Safety Res. and Education Proj., New York City, N.Y. 10027

DEVELOPMENT AND EVALUATION OF A TRAFFIC SAFETY AND ALCOHOL PROGRAM FOR SENIOR ADULTS
HS-027 612

Common Pleas Court, Cincinnati, Ohio

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

Cumberland Farm for Adolescents, Richmond, Va.

CHEMICAL DEPENDENCY PROGRAM FOR YOUTH AND YOUNG ADULTS
HS-027 615

CRC Systems, Inc., 125 Church St., Vienna, Va. 22180

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. FINAL REPORT
HS-805 120

CRC Systems, Inc., 4020 Williamsburg Court, Fairfax, Va. 22032

NATIONAL DRIVER REGISTER (NDR) ALTERNATIVE PROGRAM COST EVALUATION. PT. 2. FINAL REPORT
HS-805 129

Dynamic Science, Inc. 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, IMPALA-TO-VOLARE, TEST NO. 11. FINAL REPORT
HS-803 789

Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 1
HS-803 779

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 25 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 3. FINAL REPORT
HS-803 781

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 4. FINAL REPORT
HS-803 782

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 6. FINAL REPORT
HS-803 784

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 60 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 7. FINAL REPORT
HS-803 785

IMPACT TEST OF COMPACT VEHICLE WITH MODIFIED SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 8. FINAL REPORT
HS-803 786

BASELINE TEST OF COMPACT VEHICLE SIDE STRUCTURE, 35 MPH, 90 DEGREE IMPACT, TORINO-TO-VOLARE, TEST NO. 9. FINAL REPORT
HS-803 787

Dynamic Science, Inc., 8531 East Florence Ave., Downey, Calif. 90240

MULTIDISCIPLINARY HIGHWAY COLLISION INVESTIGATION TRAINING COURSE. FINAL REPORT
HS-805 103

Educational Broadcasting Corp., MacNeil/Lehrer Report, WNET/13, New York, N.Y. and WETA/26, Washington, D.C.

DEBATE BETWEEN SECRETARY ADAMS AND GM PRESIDENT ESTES. MAC NEIL/LEHRER REPORT, MAY 28, 1979
HS-026 396

THE AUTOMOBILE REPAIR RIPOFF. THE MAC NEIL/LEHRER REPORT, MAY 24, 1979
HS-026 397

Federal Hwy. Administration

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

Federal Hwy. Administration, Office of Hwy. Safety, Washington, D.C. 20590

HOW SAFE ARE FEDERAL-AID HIGHWAYS?
HS-026 424

Ford Motor Co.

SIMULATION OF SIDE IMPACT USING THE CAL3D OCCUPANT SIMULATION MODEL
HS-027 526

Ford Motor Co., Automotive Safety Office, P.O. Box 2053, Dearborn, Mich. 48121

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 2. METHODOLOGY AND OPTIMIZATION RESULTS. FINAL REPORT
HS-804 772

General Motors Res. Labs., Biomedical Science Dept., Warren, Mich.

RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

General Motors Res. Labs., Biomedical Science Dept., Warren, Mich.

PERFORMANCE OF A SHOULDER BELT AND KNEE RESTRAINT IN BARRIER CRASH SIMULATIONS
HS-027 525

General Motors Res. Labs., Biomedical Science Dept., Warren, Mich.

POSTURAL INFLUENCES ON THORACIC IMPACT
HS-027 546

General Motors Res. Labs., Biomedical Science Dept., Warren, Mich.

A STUDY OF DRIVER INTERACTIONS WITH AN INFLATING AIR CUSHION
HS-027 547

GCA Corp., GCA/Technology Div., Burlington Rd., Bedford, Mass. 01730

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 3. FINAL REPORT
HS-026 400

EVALUATION OF MOTOR VEHICLE EMISSIONS INSPECTION AND MAINTENANCE PROGRAMS IN OHIO. PHASE 2. FINAL REPORT
HS-026 414

Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 1: EXECUTIVE SUMMARY OF CONCLUSIONS, STRATEGIC ISSUES. FINAL REPORT
HS-804 585

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 2: STRATEGIC HISTORIES. FINAL REPORT
HS-804 586

CORPORATE STRATEGIES OF THE AUTOMOTIVE MANUFACTURERS. VOL. 3: PANORAMA OF SELECTED ECONOMIC AND OPERATING INFORMATION. FINAL REPORT
HS-804 587

Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nev. 89701

TIRE TREADWARE VALIDATION. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 792

NDT (NONDESTRUCTIVE TESTING)/ROAD CORRELATION. FINAL TECHNICAL REPORT
HS-805 034

Honeywell Systems and Res. Center, 2600 Ridgway Pkwy., Minneapolis, Minn. 55413

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 1: FINAL REPORT
HS-804 337

DRIVER-VEHICLE EFFECTIVENESS MODEL. VOL. 2: APPENDICES. FINAL REPORT
HS-804 338

Hopital Raymond Poincare, Garches, France

INFLUENCE OF MASS RATIO AND STRUCTURAL COMPATIBILITY ON THE SEVERITY OF INJURIES SUSTAINED BY THE NEAR SIDE OCCUPANTS IN CAR-TO-CAR SIDE COLLISIONS
HS-027 529

Hopital Raymond Poincare, Institut de Recherche Orthopedique, Garches, France

MODIFICATION OF PART 572 DUMMY FOR LATERAL IMPACT ACCORDING TO BIOMECHANICAL DATA
HS-027 549

Hopital Saint Louis, Paris, France

A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

Human Factors Res. Inc., 6780 Cortona Drive, Goleta, Calif. 93017

DRIVER VISIBILITY QUALITY: AN ELECTRO-OPTICAL METER FOR IN-VEHICLE MEASUREMENT OF MODULATION TRANSFER (MTF). FINAL REPORT
HS-804 105

Indiana Univ., Inst. for Res. in Public Safety, Bloomington, Ind. 47405

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 1: A REVIEW OF EXISTING DATA BASES AND RECOMMENDATIONS FOR FUTURE DATA COLLECTION. FINAL REPORT

HS-804 746

FEASIBILITY OF DEVELOPING TRAINING PROGRAMS DESIGNED TO IMPROVE DEFICIENT DRIVER FACTORS. VOL. 2: IDENTIFYING ACCIDENT AVOIDANCE BEHAVIORS: A GUIDE FOR ACCIDENT INVESTIGATORS. FINAL REPORT

HS-804 747

Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 1: CASUAL FACTOR TABULATIONS AND ASSESSMENTS. FINAL REPORT

HS-805 085

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. VOL. 2: SPECIAL ANALYSES. FINAL REPORT

HS-805 086

TRI-LEVEL STUDY: MODIFICATION, TASK 3. A VALIDITY ASSESSMENT OF POLICE-REPORTED ACCIDENT DATA. FINAL REPORT

HS-805 087

TRI-LEVEL STUDY: MODIFICATION, TASK 1. FINAL REPORT ON POTENTIAL BENEFITS OF VARIOUS IMPROVEMENTS IN VEHICLE SYSTEMS IN PREVENTING ACCIDENTS OR REDUCING THEIR SEVERITY

HS-805 094

TRI-LEVEL STUDY: MODIFICATION, TASK 4. FINAL REPORT ON THE RELATIONSHIPS BETWEEN DRIVER CHARACTERISTICS AND ACCIDENT CAUSATION

HS-805 096

TRI-LEVEL STUDY: MODIFICATION, TASK 5. AN EXAMINATION OF DRIVER CHARACTERISTICS AND COLLISION PRODUCING ERRORS OF ACCIDENT AND TRAFFIC VIOLATION REPEATERS. FINAL REPORT

HS-805 097

TRI-LEVEL STUDY: MODIFICATION, TASK 6. A FINAL REPORT ON SUPPLEMENTAL CAUSATION ASSESSMENTS THROUGH HYPOTHESIS TESTING

HS-805 098

TRI-LEVEL STUDY OF THE CAUSES OF TRAFFIC ACCIDENTS. EXECUTIVE SUMMARY. FINAL REPORT

HS-805 099

Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47405

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM. FINAL REPORT

HS-805 102

Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, N.Y. 10462

RAILROAD RETARDER NOISE REDUCTION. STUDY OF ACOUSTICAL BARRIER CONFIGURATIONS. FINAL REPORT

HS-804 354

Institute for Safety Analysis, 6400 Goldsboro Rd., Washington, D.C. 20034

NATIONAL SYMPOSIUM ON COMMERCIAL TRUCK EXPOSURE ESTIMATION. VOL. 2: PROCEEDINGS. FINAL REPORT

HS-805 122

Institute of Judicial Dynamics

THE ADDICTED DRIVER: A PROBLEM OF LAW OR MEDICINE?

HS-027 604

International Assoc. of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760

NATIONAL MAXIMUM SPEED LIMIT AND HIGHWAY SAFETY PROGRAM REGIONAL WORKSHOPS. FINAL REPORT

HS-805 148

NATIONAL MAXIMUM SPEED LIMIT (NMSL) ENFORCEMENT PRACTICES AND PROCEDURES, PHASE 2. INTERIM REPORT

HS-805 149

ADMINISTRATOR'S GUIDE TO SPEED ENFORCEMENT/PATROL CONFIGURATIONS FOR THE NATIONAL MAXIMUM SPEED LIMIT (NMSL). FINAL REPORT

HS-805 150

Iowa State Univ., Engineering Science and Mechanics Dept.

THE INFLUENCE OF DRAWBAR FLEXIBILITY AND ROLL STEER ON THE STABILITY OF ARTICULATED VEHICLES

HS-026 405

RELATIVE SIGNIFICANCE OF PARAMETERS AFFECTING LATERAL STABILITY OF ARTICULATED RECREATIONAL VEHICLES

HS-026 406

Kaman Sciences Corp., P.O. Box 7463, Colorado Springs, Colo. 80933

EVALUATION OF A NONCONTACT DISPLACEMENT GAGE FOR MEASUREMENT OF ANTHROPOMORPHIC DUMMY CHEST DEFLECTION. FINAL REPORT

HS-805 123

Kaman Sciences Corp., P.O. Box 7463, Colorado Springs, Colo. 80933

DEVELOPMENT OF AN EDDY CURRENT NONCONTACT DISPLACEMENT GAGE FOR MONITORING ANTHROPOMORPHIC DUMMY CHEST DEFLECTIONS. FINAL REPORT

HS-805 124

Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209

THE NATIONAL PARTS RETURN PROGRAM. VOL. 1: INDEPENDENT REPAIR FACILITIES. FINAL REPORT

HS-805 144

Lead Industries Assoc., Inc., 292 Madison Ave., New York City, N.Y. 10017

BATTERY POWERED ELECTRIC VEHICLES. STATE-OF-THE-ART 1978

HS-026 415

Lexington Technology Associates, 10 Wingate Rd., Lexington, Mass. 02173

SEAT BELTS: 1949-1956. FINAL REPORT.
HS-803 911

CASE STUDY OF THE INNOVATION PROCESS CHARACTERIZING THE DEVELOPMENT OF THE THREE-WAY CATALYTIC CONVERTER SYSTEM. FINAL REPORT
HS-804 791

Mary Bridge Children's Health Center, Pierce County, Wash.

EPIDEMIOLOGY OF CHILDHOOD MOTOR VEHICLE RELATED ACCIDENTS
HS-027 531

McGill Univ., Dept. of Mechanical Engineering, Montreal, Que., Canada

INJURY MECHANISMS TO FULLY RESTRAINED OCCUPANTS
HS-027 522

Michigan Technological Univ.

A SIMPLIFIED ANALYSIS OF THE STEADY-STATE TURNING OF ARTICULATED VEHICLES
HS-026 407

Milford Fabricating Co., Detroit, Mich.

FABRICATION AND ASSEMBLY OF A GRAPHITE FIBER REINFORCED PLASTIC VEHICLE
HS-026 391

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 3: INVESTIGATION OF POTENTIAL CRASH SURVIVABILITY OF A CURRENT PRODUCTION SUBCOMPACT VEHICLE EQUIPPED WITH AN ADVANCED DRIVER RESTRAINT SYSTEM. FINAL REPORT.
HS-805 054

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 4. EVOLVING A LOW MOUNT PASSENGER AIR CUSHION RESTRAINT SYSTEM (ACRS) FOR THE VEGA SUBCOMPACT VEHICLE. FINAL REPORT
HS-805 055

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 073

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 1: ANALYSIS OF ACCIDENT DATA, ENGINEER'S POINT OF VIEW. INTERIM REPORT
HS-805 074

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 2: ANALYSIS OF ACCIDENT DATA, STATISTICIAN/ANALYST'S POINT OF VIEW. INTERIM REPORT
HS-805 075

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. VOL. 3: APPENDICES. INTERIM REPORT
HS-805 076

Minnesota Dept. of Transportation, Traffic Management Center, 1101 4th Ave. S., Minneapolis, Minn. 55404

EVALUATION OF HIGHWAY ADVISORY RADIO IN THE I-35W TRAFFIC MANAGEMENT NETWORK. FINAL REPORT
HS-026 393

National Com. on Uniform Traffic Laws and Ordinances

STATE LAWS ON PROBATIONARY LICENSING AND LICENSING OF MINORS
HS-804 549

National Council on Alcoholism, Washington, D.C.

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

National Hwy. Traffic Safety Administration, Driver Licensing and Adjudication Div., Washington, D.C. 20590

THE DELPHI PROJECT ON THE VIEW OF CRIMINAL JUSTICE OFFICIALS ON ALCOHOL SAFETY ADJUDICATION AND REFERRAL COUNTERMEASURE EFFECTIVENESS
HS-027 606

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, NRD-34, 2100 2nd St., S.W., Washington, D.C. 20590

MOTOR VEHICLE TRAFFIC FATALITIES IN THE UNITED STATES. TRENDS FROM 1975 TO 1978 AND 1979 4-MONTH ESTIMATES
HS-804 783

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590

FARS, FATAL ACCIDENT REPORTING SYSTEM, 1978 ANNUAL REPORT
HS-804 832

RESTRAINT USAGE AND EFFECTIVENESS ON THE NATIONAL CRASH SEVERITY STUDY
HS-805 151

National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washington, D.C. 20590

DRIVER LICENSING. REV. ED.
HS-805 043

PASSIVE RESTRAINTS
HS-805 044

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590

CHILD RESTRAINTS. ISSUE PAPER
HS-803 819

NONRESIDENT VIOLATOR COMPACT OF 1977. ISSUE PAPER
HS-803 820

55 MPH MAXIMUM SPEED LIMIT RADAR DETECTION DEVICES. ISSUE PAPER
HS-803 821

ALCOHOL COUNTERMEASURES: ILLEGAL PER SE AND PRELIMINARY BREATH TESTING LAWS. ISSUE PAPER
HS-803 823

GENERAL SAFETY BELT USAGE. ISSUE PAPER
HS-803 824

URBAN PEDESTRIAN SAFETY. ISSUE PAPER
HS-803 825

National Hwy. Traffic Safety Administration, Washington, D.C. 20590

NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CHILD SAFETY ACTIVITIES
HS-027 533

DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

National Hwy. Traffic Safety Administration, Washington, D.C. 20590

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO MARCH 31, 1979
HS-804 472

National Hwy. Traffic Safety Administration, Washington, D.C. 20590

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 834

NCA (NATIONAL COUNCIL ON ALCOHOLISM) ALCOHOL AND TRAFFIC SAFETY SESSION (1979) PROCEEDINGS, APRIL 30 THROUGH MAY 2, 1979
HS-804 857

REMARKS AT 55 MPH NATIONAL MAXIMUM SPEED LIMIT CONFERENCE, REGION 3, BALTIMORE HILTON HOTEL, BALTIMORE, MARYLAND, TUESDAY, MAY 22, 1979
HS-810 353

EMERGENCY MEDICAL SERVICES INSTRUCTOR TRAINING COURSE
HS-900 031

National Safety Council, 444 North Michigan Ave., Chicago, Ill. 60611

REVIEW OF LEGAL LITERATURE PUBLISHED BETWEEN JULY, 1974 AND JULY, 1978 PERTAINING TO ALCOHOL AND DRUG INVOLVEMENT IN HIGHWAY SAFETY
HS-805 082

Naval Construction Battalion Center, Civil Engineering Lab., Port Hueneme, Calif.

INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

New Jersey Dept. of Health

THERE IS MORE TO A DWI (DRIVING WHILE INTOXICATED) CASE THAN A BAC (BLOOD ALCOHOL CONCENTRATION) READING: A JUDGE'S RESPONSIBILITY TO THE DRINKING DRIVER
HS-027 605

New Jersey Div. of Motor Vehicles, Bureau of Alcohol Countermeasures

ALCOHOL COUNTERMEASURES: ALIVE AND DOING VERY WELL IN NEW JERSEY
HS-027 618

New Mexico State Univ.

TESTS AND MATERIALS FOR SCHOOL BUS RETROFIT APPLICATIONS
HS-027 537

New York State Dept. of Motor Vehicles, Albany, N.Y. 12228

THE NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM
HS-027 620

Newfound Memorial High School, Bristol, N.H.

PROJECT ADAPTS (ALCOHOL - DRIVERS AND PEOPLE - TEACHING SAFETY)
HS-027 614

Nordyke and Associates, Ltd., 8027 Leesburg Pike, Vienna, Va. 22180

FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. FINAL REPORT
HS-805 147

Old Dominion Univ., Addiction Res. and Treatment Center, Norfolk, Va. 23508

THE APPLICATION OF "STATE OF THE ART" INTERVENTION AND EVALUATION TECHNOLOGY: PROSPECTS FOR THE FUTURE OF THE ALCOHOL AND TRAFFIC SAFETY COUNTERMEASURES APPROACH
HS-027 602

Organisme National de Securite Routiere, Laboratoire des Chocs et de Biomecanique, France

EVALUATION OF HUMAN TOLERANCE IN FRONTAL IMPACTS
HS-027 550

Pabon, Sims, Smith and Associates, Inc., 1435 G St., N.W., Suite 603, Washington, D.C. 20005

HIGHWAY TRAFFIC SAFETY MANAGEMENT ORIENTATION MODULE DEVELOPMENT. ADMINISTRATIVE EVALUATION. FINAL TECHNICAL REPORT
HS-805 069

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036

ALTERNATIVE SURVEILLANCE CONCEPTS AND METHODS FOR FREEWAY INCIDENT MANAGEMENT. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-026 413

Pioneer Engineering and Mfg. Co., 2500 East Nine Mile Road, Warren, Mich. 48091

IMPACT OF FMVSS 208 COMFORT AND CONVENIENCE ON VEHICLE MANUFACTURING. FINAL REPORT
HS-805 135

Prince George's County Health Dept., Md.

PRINCE GEORGE'S COUNTY: A LOCAL HEALTH DEPARTMENT CONFRONTS THE YOUNG DRINKING DRIVER
HS-027 613

Regie Nationale des Usines Renault, France

CONTINUOUSLY VARIABLE TRANSMISSIONS FOR CARS WITH HIGH RATIO COVERAGE
HS-026 389

PURELY HYDROSTATIC HIGH RATIO TRANSMISSION
HS-026 390

Research Inst. for Road Vehicles (TNO), Delft, Holland
CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

Richard L. Deal and Associates, 10560 Main St., Fairfax, Va. 22030
NDR [NATIONAL DRIVER REGISTER] RAPID RESPONSE SYSTEM SUPPORT SERVICE. FINAL REPORT
HS-805 072

Richmond Alcohol Safety Action Proj.
DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

Robert Bosch G.m.b.H., Germany
A STRATEGY FOR OPTIMIZATION OF DIESEL FUEL INJECTION SYSTEM
HS-026 398

Robert Whorf and Associates, 8215 Cedar Rd., Elkins Park, Pa. 19117
MANUFACTURER'S POLICIES CONCERNING AVERAGE FUEL ECONOMY STANDARDS. FINAL REPORT
HS-803 720

Science Applications, Inc., 1801 Ave. of the Stars, Suite 1205, Los Angeles, Calif. 90067
LONG LIFE HYDRAULIC BRAKE SYSTEM. FINAL TECHNICAL REPORT
HS-805 067

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, pa. 15096
STAPP CAR CRASH CONFERENCE (23RD) PROCEEDINGS, OCTOBER 17-19, 1979, SAN DIEGO, CALIFORNIA
HS-027 520

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
DYNAMICS OF WHEELED RECREATIONAL VEHICLES
HS-026 402

South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 2, FINAL TECHNICAL REPORT
HS-804 911

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS. VOL. 3, APPENDIX A, DESCRIPTION OF COMPUTER PROGRAMS. FINAL REPORT
HS-804 913

Stanford Univ., Dept. of Mechanical Engineering, Stanford, Calif.
CHARACTERIZATION OF WHEEL-ROADWAY INTERACTION FOR RECREATIONAL VEHICLES
HS-026 403

STEADY TURNING OF TWO-WHEELED VEHICLES
HS-026 409

Systems Technology, Inc., Hawthorne, Calif.
DETERMINATION OF TRAILER STABILITY THROUGH SIMPLE ANALYTICAL METHODS AND TEST PROCEDURES
HS-026 408

Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
THE EFFECTS OF ALCOHOL ON THE DRIVER'S DECISION-MAKING BEHAVIOR. VOL. 2: APPENDICES. FINAL REPORT
HS-803 609

Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
MOTORCYCLE HANDLING. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-804 190

MOTORCYCLE HANDLING. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-804 191

Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
EVALUATION OF THE MULLARD/TRRL (TRANSPORT AND ROAD RESEARCH LABORATORY) ANTI-LOCK BRAKE SYSTEM. FINAL REPORT
HS-804 192

DEVELOPMENT OF AERODYNAMIC DISTURBANCE TEST PROCEDURES. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 079

Tampa-Hillsborough, Inc., D.W.I. Counterattack School, Tampa, Fla.
THE CLASS THAT WAS DESIGNED TO TEACH - EACH ONE (DRINKING/DRIVING COUNTERMEASURE PROGRAM FOR ILLITERATE PERSONS)
HS-027 617

Technical Univ. of Berlin, Inst. of Automotive Engineering
COMPARISON OF PASSENGER INJURIES IN FRONTAL CAR COLLISIONS WITH DUMMY LOADINGS IN EQUIVALENT SIMULATIONS
HS-027 528

Technical Univ. Berlin, Inst. for Automotive Engineering, Berlin, Germany
SEAT DESIGN--A SIGNIFICANT FACTOR FOR SAFETY BELT EFFECTIVENESS
HS-027 523

Teknekron, Inc., 1483 Chain Bridge Rd., McLean, Va. 22101
OCCUPANT RESTRAINT LEGISLATION HANDBOOK: A GUIDE FOR PROPONENTS. FINAL REPORT
HS-804 780

Transport and Road Res. Lab., Transport Engineering Div., Crowthorne, Berks., England
FUEL UTILIZATION OF ARTICULATED VEHICLES: EFFECT OF GROSS VEHICLE WEIGHT
HS-026 426

U.E.R. Saints Peres, Laboratoire d'Anatomie, Paris, France
A COMPARISON BETWEEN PART 572 DUMMY AND HUMAN SUBJECT IN THE PROBLEM OF SUBMARINING
HS-027 544

Ultrasystems, Inc., 2400 Michelson Drive, Irvine, Calif. 92715
OPTIMUM FREQUENCY OF INSPECTION. FINAL REPORT (BRAKE SYSTEM COMPONENTS)
HS-804 723

University of Birmingham, Dept. of Transportation and Environmental Planning, Birmingham, England
SOME FACTORS INFLUENCING THE INJURIES SUSTAINED BY CHILD PEDESTRIANS STRUCK BY THE FRONTS OF CARS
HS-027 534

University of California at Los Angeles, Alcohol Res. Center, Los Angeles, Calif.
CHARACTERISTICS OF DWI'S (DRIVING WHILE INTOXICATED), ALCOHOLICS, AND CONTROLS
HS-027 598

University of California, Dept. of Pathology, San Diego, Calif.
RESPONSE OF BELT RESTRAINED SUBJECTS IN SIMULATED LATERAL IMPACT
HS-027 524

University of California, San Diego Univ. Hosp.
INTRACRANIAL PRESSURE RELATIONSHIPS IN THE PROTECTED AND UNPROTECTED HEAD
HS-027 542

University of California, San Diego, Dept. of Surgery
THE RESPONSE OF UNEMBALMED CADAVERIC AND LIVING CEREBRAL VESSELS TO GRADED INJURY--A PILOT STUDY
HS-027 539

University of Cincinnati, Engineering Science Dept., Cincinnati, Ohio
OFF-ROAD STABILITY OF RECREATIONAL VEHICLES
HS-026 410

University of Glasgow, Glasgow, Scotland
DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

University of Illinois at Urbana-Champaign
EFFECTS OF ALCOHOL AND DIAZEPAM, SINGLY AND IN COMBINATION, ON SOME DRIVING PERFORMANCES
HS-027 611

University of Illinois, Dept. of Health and Safety Education, Champaign, Ill. 61820
FIELD TEST EVALUATION OF REAR LIGHTING DECELERATION SIGNALS: 1. ANALYTICAL AND EXPERIMENTAL STUDIES. INTERIM REPORT
HS-805 061

University of Kentucky, Lexington, Ky.
EFFECT OF HITCHPOINT LATERAL STIFFNESS ON TRAILER STABILITY
HS-026 404

University of Michigan, Hwy. Safety Res. Inst.
CHILD RESTRAINT EVALUATION BY EXPERIMENTAL AND MATHEMATICAL SIMULATION
HS-027 535

HEAD IMPACT RESPONSE COMPARISONS OF HUMAN SURROGATES
HS-027 538

University of Michigan, Hwy. Safety Res. Inst.
DEVELOPMENT OF TESTING AND EVALUATION OF CHILD RESTRAINT SYSTEMS AND CHILD TEST DUMMIES BY NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 536

University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DESIGN FOR A NATIONAL EXPOSURE DATA SYSTEM (NEDS): RECOMMENDED FEATURES AND PROPOSED PILOT METHODOLOGICAL STUDIES. FINAL REPORT
HS-804 548

University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
CALIBRATION AND TEST PROCEDURES FOR THREE YEAR OLD CHILD DUMMY. FINAL REPORT
HS-805 070

DEVELOPMENT AND TESTING OF TECHNIQUES FOR INCREASING THE CONSPICUITY OF MOTORCYCLES AND MOTORCYCLE DRIVERS. FINAL REPORT
HS-805 143

University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
RESTRAINT SYSTEM/SPEED LIMIT PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 1. SUPPLEMENT 1
HS-804 784

ALCOHOL/SAFETY PUBLIC INFORMATION MATERIALS CATALOG. NUMBER 3. SUPPLEMENT 3
HS-804 785

DESIGNING A HEALTH/LEGAL SYSTEM: A MANUAL. FINAL REPORT (DRUNK DRIVING CASES)
HS-805 138

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL SUMMARY REPORT
HS-805 140

THE YAW STABILITY OF TRACTOR-SEMITRAILERS DURING CORNERING. FINAL REPORT
HS-805 141

University of Missouri-Kansas City, 2411 Holmes St., Kansas City, Mo. 64108
DEVELOPMENT OF A LOW COST PORTABLE FLUOROMETRY TECHNOLOGY AND QUANTIFICATION OF CANNABINOIDS IN BODY FLUIDS. FINAL REPORT
HS-804 009

University of Missouri-Rolla, Rolla, Mo.
DPMAS (DRIVER PERFORMANCE MEASUREMENT AND ANALYSIS SYSTEM) UTILIZATION. VEHICLE PARAMETER IDENTIFICATION. FINAL TECHNICAL REPORT.
HS-804 721

University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL.

2: DATA ANALYSIS AND USAGE AND ACCIDENT PROJECTIONS. FINAL REPORT
HS-805 036

University of North Carolina, Hwy. Safety Res. Center, South Campus, CTP, 197A, Chapel Hill, N.C. 27514
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 2. USER MANUAL. FINAL REPORT
HS-804 733

University of Pennsylvania
DIFFERENTIAL TOLERANCE OF FRONTAL AND TEMPORAL LOBES TO CONTUSION INDUCED BY ANGULAR ACCELERATION
HS-027 540

University of South Dakota, Human Factors Lab.
IMPLEMENTATION OF A LARGE SCALE REHABILITATION PROGRAM EVALUATION (DRUNK DRIVING OFFENDERS)
HS-027 601

University of Southern California, Inst. of Safety and Systems Management, Traffic Safety Center, Los Angeles, Calif. 90007
INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS, VOL. 1. FINAL REPORT
HS-804 840

INVESTIGATION OF MOTOR VEHICLE/BICYCLE COLLISION PARAMETERS. VOL. 2. APPENDICES. FINAL REPORT
HS-804 841

University of Tennessee, Mechanical and Aerospace Engineering Dept., Knoxville, Tenn.
CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 1: SUMMARY REPORT. FINAL REPORT
HS-805 125

University of Tennessee, Mechnical and Aerospace Engineering Dept., Knoxville, Tenn. 37916
CORRELATION OF BRAKING SYSTEM DEFECTS AND PERFORMANCE INSPECTION. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 126

Urban Scientific and Educational Res., Inc., P.O. Box 19112, 20th St. Station, Washington, D.C. 20036
REGIONAL WORKSHOPS ON BICYCLE SAFETY: PRESENTATIONS, PARTICIPANT PROBLEMS, PROGRAMS IDEAS, AND RECOMMENDATIONS. FINAL REPORT
HS-803 658

Value Engineering Lab., 2550 Huntington Ave., Alexandria, Va. 22303
NEW AND REBUILT BRAKE MASTER CYLINDER SURVEY AND PERFORMANCE EVALUATION. FINAL REPORT
HS-805 101

Village Prosecutor, Park Forest, Ill.
AN HONEST IMPLIED CONSENT LAW (DRIVING WHILE INTOXICATED OFFENSES)
HS-027 607

Virginia Commonwealth Univ., School of Social Work, Richmond, Va.
DRUNK DRIVING AMONG YOUTH AND YOUNG ADULTS. A DESCRIPTION OF A PILOT STUDY FOR REDUCING DRINKING AND DRIVING AMONG YOUNG PEOPLE IN RICHMOND, VIRGINIA
HS-027 616

Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
A MANAGEMENT SYSTEM FOR EVALUATING TRAILER/MOTORCYCLE, AUTO/TRUCK, AND REJECTION RECEIPTS IN THE VIRGINIA PERIODIC MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORT
HS-026 401

VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES
HS-026 416

Washington State Dept. of Licensing, Res. and Technology Div., Olympia, Wash. 98504
REHABILITATION EFFECTIVENESS FOR SAFE PROJECT DRIVERS RECEIVING DEFENSIVE DRIVING COURSE TRAINING. A SUPPLEMENTAL EVALUATION REPORT. FINAL REPORT
HS-804 777

Wayne State Univ., Bioengineering Center, Detroit, Mich.
BIODYNAMICS OF THE LIVING HUMAN SPINE DURING -GX IMPACT ACCELERATION
HS-027 545

Wayne State Univ., Detroit, Mich.
FEMORAL LOADS MEASURED BY A SIX-AXIS LOAD CELL
HS-027 530

Wayne State Univ., School of Medicine, Detroit, Mich.
ACCELERATION INDUCED SHEAR STRAINS IN A MONKEY BRAIN HEMISECTION
HS-027 541

Wilson-Hill Associates, Inc., 1025 15th St., N.W., Suite 700, Washington, D.C. 20005
DATA ANALYSIS OF TRACTOR-TRAILER DRIVERS TO ASSESS DRIVERS' PERCEPTION OF HEAVY DUTY TRUCK RIDE QUALITY. FINAL REPORT
HS-805 139

blank page

Contract Number Index

DOT-FH-11-8565
Minnesota Dept. of Transportation, Traffic Management Center, 1101 4th Ave. S., Minneapolis, Minn. 55404 HS-026 393

DOT-FH-11-8813
Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036 HS-026 413

DOT-HS-034-3-535
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 085
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 086
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 087
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 094
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 096
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 097
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 098
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401 HS-805 099

DOT-HS-343-3-682
Washington State Dept. of Licensing, Res. and Technology Div., Olympia, Wash. 98504 HS-804 777

DOT-HS-4-00968
University of Missouri-Kansas City, 2411 Holmes St., Kansas City, Mo. 64108 HS-804 009

DOT-HS-4-00985
Applied Science Associates, Inc., Valencia, Pa. 16059 HS-027 608

DOT-HS-4-00999
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250 HS-803 609

DOT-HS-5-01104
Dynamic Science, Inc. 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 789
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 779
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 781
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 782
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 784
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 785
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 786
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027 HS-803 787

DOT-HS-5-01121
National Com. on Uniform Traffic Laws and Ordinances HS-804 549

DOT-HS-5-01163
Applied Science Associates, Inc., Box 158, Valencia, Pa. 16059 HS-805 127

DOT-HS-5-01231
University of Southern California, Inst. of Safety and Systems Management, Traffic Safety Center, Los Angeles, Calif. 90007 HS-804 840
University of Southern California, Inst. of Safety and Systems Management, Traffic Safety Center, Los Angeles, Calif. 90007 HS-804 841

DOT-HS-5-01232
Wayne State Univ., Bioengineering Center, Detroit, Mich. HS-027 545

DOT-HS-5-01250
University of North Carolina, Hwy. Safety Res. Center, South Campus, CTP, 197A, Chapel Hill, N.C. 27514 HS-804 733

DOT-HS-6-01319
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DOT-HS-6-01345
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DOT-HS-6-01345-Mod-8
International Assoc. of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760 HS-805 148

DOT-HS-6-01347
Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nev. 89701 HS-804 792

DOT-HS-6-01367
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
HS-805 070

DOT-HS-6-01381
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
HS-804 190

Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
HS-804 191

Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
HS-804 192

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HS-805 054

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HS-805 055

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HS-804 105

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HS-805 144

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Ford Motor Co., Automotive Safety Office, P.O. Box 2053, Dearborn, Mich. 48121
HS-804 772

DOT-HS-6-01447
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HS-805 061

DOT-HS-6-01449
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
HS-805 073

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
HS-805 074

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HS-805 075

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HS-805 076

DOT-HS-6-01459
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HS-805 143

DOT-HS-6-01479
Budd Co., Technical Center, 375 Commerce Drive, Fort Washington, Pa. 19034
HS-805 064

Budd Co., Technical Center, 375 Commerce Drive, Fort Washington, Pa. 19034
HS-805 065

DOT-HS-6-01512
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HS-805 103

DOT-HS-7-01511
Calspan Corp., Advanced Technology Center
HS-027 543

Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
HS-805 038

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HS-805 039

DOT-HS-7-01533
University of Missouri-Rolla, Rolla, Mo.
HS-804 721

DOT-HS-7-01544
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HS-804 127

DOT-HS-7-01550
Kaman Sciences Corp., P.O. Box 7463, Colorado Springs, Colo. 80933
HS-805 124

DOT-HS-7-01589
Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nev. 89701
HS-805 034

DOT-HS-7-01602
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
HS-805 140

University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
HS-805 141

DOT-HS-7-01620
Chi Associates, Inc., 1011 Arlington Blvd., Suite 316, Arlington, Va. 22209
HS-805 083

Chi Associates, Inc., 1011 Arlington Blvd., Suite 316, Arlington, Va. 22209
HS-805 084

DOT-HS-7-01621
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HS-805 125

University of Tennessee, Mechnical and Aerospace Engineering Dept., Knoxville, Tenn. 37916
HS-805 126

DOT-HS-7-01642
Richard L. Deal and Associates, 10560 Main St., Fairfax, Va. 22030
HS-805 072

DOT-HS-7-01644
Teknekron, Inc., 1483 Chain Bridge Rd., McLean, Va. 22101
HS-804 780

DOT-HS-7-01650
Ultrasystems, Inc., 2400 Michelson Drive, Irvine, Calif. 92715; Artec, Inc., St. Louis, Mo.
HS-804 723

DOT-HS-7-01663
National Safety Council, 444 North Michigan Ave., Chicago, Ill. 60611
HS-805 082

DOT-HS-7-01685
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
HS-804 548

DOT-HS-7-01690
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47405; Center for the Environment and Man, Hartford, Conn.
HS-805 102

DOT-HS-7-01716
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
HS-805 079

DOT-HS-7-01720
Systems Technology, Inc., Hawthorne, Calif.
HS-026 408

DOT-HS-7-01722
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HS-804 911

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HS-804 913

DOT-HS-7-01723
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HS-804 339

Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140
HS-804 340

DOT-HS-7-01768
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HS-805 101

DOT-HS-7-01776
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HS-805 067

DOT-HS-7-01783
Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116
HS-804 585

Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116
HS-804 586

Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116
HS-804 587

DOT-HS-7-01785
Wayne State Univ., Detroit, Mich.
HS-027 530

DOT-HS-7-01798
Urban Scientific and Educational Res., Inc., P.O. Box 19112, 20th St. Station, Washington, D.C. 20036
HS-803 658

DOT-HS-7-01811
Indiana Univ., Inst. for Res. in Public Safety, Bloomington, Ind. 47405
HS-804 746

Indiana Univ., Inst. for Res. in Public Safety, Bloomington, Ind. 47405
HS-804 747

DOT-HS-7-01812
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
HS-805 138

DOT-HS-8-01887
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
HS-805 036

DOT-HS-8-02022
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
HS-805 071

DOT-HS-8-02037
Wilson-Hill Associates, Inc., 1025 15th St., N.W., Suite 700, Washington, D.C. 20005
HS-805 139

DOT-HS-8-02046
Institute for Safety Analysis, 6400 Goldsboro Rd., Washington, D.C. 20034
HS-805 122

DOT-HS-8-02063
Pabon, Sims, Smith and Associates, Inc., 1435 G St., N.W., Suite 603, Washington, D.C. 20005
HS-805 069

DOT-HS-9-02087
CRC Systems, Inc., 125 Church St., Vienna, Va. 22180
HS-805 120

CRC Systems, Inc., 4020 Williamsburg Court, Fairfax, Va. 22032
HS-805 129

DOT-HS-9-02110
Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154; Pioneer Engineering and Mfg. Co., 2500 East Nine Mile Road, Warren, Mich. 48091
HS-805 135

DOT-TSC-1035
Burlington Northern, Inc., 176 East 5th St., St. Paul, Minn. 55101; Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, N.Y. 10462
HS-804 354

DOT-TSC-1355
Lexington Technology Associates, 10 Wingate Rd., Lexington, Mass. 02173
HS-803 911

Lexington Technology Associates, 10 Wingate Rd., Lexington, Mass. 02173
HS-804 791

DOT/TSC-1046
Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140
HS-803 856

EPA-68-02-2607-TO-16
GCA Corp., GCA/Technology Div., Burlington Rd., Bedford, Mass. 01730
HS-026 414

EPA-68-02-2887
GCA Corp., GCA/Technology Div., Burlington Rd., Bedford, Mass. 01730
HS-026 400

NHTSA-P.O.-8-0251
Kaman Sciences Corp., P.O. Box 7463, Colorado Springs, Colo. 80933
HS-805 123

NHTSA-8-0391
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
HS-804 784
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
HS-804 785

NHTSA-9-6691
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HS-805 147

N00014-75-C-0975
Wayne State Univ., School of Medicine, Detroit, Mich.
HS-027 541

OH-00404-04
University of California, San Diego Univ. Hosp.; Naval Construction Battalion Center, Civil Engineering Lab., Port Hueneme, Calif.
HS-027 542

OSU-77-00110
McGill Univ., Dept. of Mechanical Engineering, Montreal, Que., Canada
HS-027 522

OTS-057701
California Dept. of Motor Vehicles, Res. and Devel. Section, P.O. Box 1828, Sacramento, Calif. 95809
HS-027 600

Ref: DOT-HS-034-2-263
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401
HS-805 099

Ref: DOT-HS-064-3-687
Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nev. 89701
HS-805 034

SB3-4-0-8(A)-78-C-1178
Wilson-Hill Associates, Inc., 1025 15th St., N.W., Suite 700, Washington, D.C. 20005
HS-805 139

TS-13750
Robert Whorf and Associates, 8215 Cedar Rd., Elkins Park, Pa. 19117
HS-803 720

Report Number Index

ASA-492	HS-805 127
C-81215-Vol-1	HS-804 339
C-81215-Vol-2	HS-804 340
DOL-NHTSA-78-1	HS-804 777
DOT-HS-034-3-535-(Mod.-T-1)	HS-805 094
DOT-HS-034-3-535-(Mod.-T-3)	HS-805 087
DOT-HS-034-3-535-(Mod.-T-4)	HS-805 096
DOT-HS-034-3-535-(Mod.-T-5)	HS-805 097
DOT-HS-034-3-535-(Mod.-T-6)	HS-805 098
DOT-HS-034-3-535-77-TAC(1)-Vol-1	HS-805 085
DOT-HS-034-3-535-77-TAC(1)-Vol-2	HS-805 086
DOT-HS-034-3-535-79-TAC(S)	HS-805 099
DOT-HS-7-01811-79(1)	HS-804 746
DOT-HS-7-01811-79-TF(2)	HS-804 747
DOT-TSC-NHTSA-78-42	HS-803 720
DOT-TSC-NHTSA-79-1	HS-803 911
DOT-TSC-NHTSA-79-11.II	HS-803 856
DOT-TSC-NHTSA-79-35	HS-804 354
DOT-TSC-NHTSA-79-36	HS-804 791
DSI-MDHCIT-4-and-5	HS-805 103
EPA-905/2-78-006	HS-026 414
EPA-905/2-78-007	HS-026 400
FHWA-RD-77-58	HS-026 413
FHWA-RD-79-33	HS-026 393
FR-1061-07-79(ES)	HS-805 073
GCA-TR-78-38-G(1)	HS-026 414
GCA-TR-78-59-G	HS-026 400
IR-1061-06-79-(I)	HS-805 074
IR-1061-06-79-(II)	HS-805 075
IR-1061-06-79-(III)	HS-805 076
K-78-45U(R)	HS-805 124
K-78-74U(R)	HS-805 123
KAPPA-DOT-79-01	HS-805 144
LIA-L-24-20M-12-77	HS-026 415
PB-286 209	HS-026 414
PB-288 811	HS-803 609
PB-290 323	HS-026 400
PB-298 116	HS-804 746
PB-298 461	HS-804 780
PB-298 768	HS-804 747
Rept. for Oct 1977-Nov 1978. Vol. 1 is HS-804 585	HS-804 586
RSS-DMV-50-4/79	HS-027 600
Safety-Res-79-2	HS-805 061
SAE-P-82	HS-027 520
SAE-SP-443	HS-026 402
SAE-790029	HS-026 391
SAE-790036	HS-026 398
SAE-790041	HS-026 389

SAE-790042	HS-026 390
SAE-790181	HS-026 403
SAE-790182	HS-026 404
SAE-790183	HS-026 405
SAE-790184	HS-026 406
SAE-790185	HS-026 407
SAE-790186	HS-026 408
SAE-790187	HS-026 409
SAE-790188	HS-026 410
SAE-791002	HS-027 521
SAE-791003	HS-027 522
SAE-791004	HS-027 523
SAE-791005	HS-027 524
SAE-791006	HS-027 525
SAE-791007	HS-027 526
SAE-791008	HS-027 527
SAE-791009	HS-027 528
SAE-791010	HS-027 529
SAE-791012	HS-027 530
SAE-791013	HS-027 531
SAE-791014	HS-027 532
SAE-791015	HS-027 533
SAE-791016	HS-027 534
SAE-791017	HS-027 535
SAE-791018	HS-027 536
SAE-791019	HS-027 537
SAE-791020	HS-027 538
SAE-791021	HS-027 539
SAE-791022	HS-027 540
SAE-791023	HS-027 541
SAE-791024	HS-027 542
SAE-791025	HS-027 543
SAE-791026	HS-027 544
SAE-791027	HS-027 545
SAE-791028	HS-027 546
SAE-791029	HS-027 547
SAE-791030	HS-027 548
SAE-791031	HS-027 549
SAE-791032	HS-027 550
SAI-068-80-516	HS-805 067
SB-36	HS-805 043
SB-37	HS-805 044
STI-TR-1053-1	HS-803 609
STI-TR-1086-1-I	HS-804 190
STI-TR-1086-1-II	HS-804 191
STI-TR-1086-2	HS-804 192
STI-TR-1117-1-II	HS-805 079
TCR-0385	HS-805 064 HS-805 065
TRRL-SR-424	HS-026 426
UM-HSRI-78-79	HS-804 548

UM-HSRI-79-21-1	HS-805 140
UM-HSRI-79-21-2	HS-805 141
UM-HSRI-79-28	HS-804 784
UM-HSRI-79-29	HS-804 785
UM-HSRI-79-4	HS-805 070
UM-HSRI-79-55	HS-805 138
UM-HSRI-79-76	HS-805 143
Vol. 3 is HS-804 587.	HS-804 586
VHTRC-79-R47	HS-026 401
VHTRC-79R22	HS-026 416
ZQ-5993-V-1	HS-804 094
ZQ-6057-V-4	HS-805 038
ZQ-6057-V-5	HS-805 039
1780-1	HS-804 105
20-1-1021	HS-805 034
20-1-980	HS-804 792
6385-V-1	HS-805 071
78SRC113	HS-804 337
78SRC114	HS-804 338
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79-1-Vol-2	HS-804 841
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NOTICE

The March and April issues of Highway Safety Literature are being issued before the February one. This is due to a delay caused by changing one of the contractors and computers used in processing the journal. We expect that the February issue will be available shortly, and that future issues will appear in chronological order.

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Highway Safety Literature is a monthly publication of the National Highway Traffic Safet Administration (NHTSA). It is divided into the following sections: Abstract Citations, containin bibliographical information and abstracts; and an Index to Abstracts, including a keyword-out-o context (KWOC) list of words in the title, followed by the full title and HS number (our accessio number); an Author Index; a Corporate Author Index; a Contract Number Index; and a Repor Number Index. In those months when information on contracts recently awarded is available, section entitled Contracts Awarded is added at the back.

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Editor
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Washington, D.C. 20590

AVAILABILITY OF DOCUMENTS

Documents listed in *Highway Safety Literature* are not available from the National Highway Traffic Safety Administration unless so specified. They must be ordered from the sources indicated on the citations, usually at cost. Ordering information for the most common sources is given below.

NTIS: National Technical Information Service, Springfield, Va. 22161. **Order by title and accession number: PB, AD, or HS.** When no PB number is given for NHTSA Technical Reports, order by prefacing the HS number with DOT, i.e. DOT-HS-000 000.

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and catalog or stock number.**

Reference copy only: Documents may be examined at the NHTSA Technical Reference Division or borrowed on inter-library loan through your local library.

See publication: Articles in journals, papers in proceedings, or chapters in books are found in the publication cited. These publications may be in libraries or purchased from publishers or dealers.

SAE: Society of Automotive En gineers, Dept. HSL, 400 Com monwealth Drive, Warrendale Pa. 15096. Order by title and SAE report number.

TRB: Transportation Researc Board, National Academy o Sciences, 2101 Constitution Ave. N.W., Washington, D.C. 20418.

Corporate author: Inquiries shoul be addressed to the organizatio listed in the individual citation.

ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning maximum amount of brake pedal force that automobile dri were able to sustain over a period of ten seconds. Sub were told to apply the brakes in the test car as they would panic stop, and to exert as much force as possible on pedal over the entire ten second test period. A total of 84 jects were tested, including 42 males and 42 females. results indicated that there is a wide distribution of va which characterizes the pedal force that the subjects were to generate. Male subjects produced generally higher fo than did females. Over half the women tested were unab exert more than 150 lbs. of force with either foot alone, when both feet were applied to the pedal, force levels rose nificantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under infla pressure are deduced by assuming the bias tire as a compo structure of a bias-laminated, toroidal membrane shell rigorously taking three displacement components into c sideration. The point collocation method is used to solv derived system of differential equations with variable co cients. It is found that the lowest natural frequencies ca lated for two kinds of bias tire agree well with the correspo ing experimental results in a wide range of inflation pressu Results of the approximate analysis show that the influer of the in-plane inertia forces on natural frequency may be c sidered small, but the influences of in-plane displacements large, particularly on the natural frequency of the tire ur low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 197
Publication date	1976; 6refs
Availability	Availability: See publication

HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT

by Delores A. Cutler; Sue F. Knapp
Ecosometrics, Inc., 4715 Cordell Ave., Bethesda, Md. 20014
DOT-OS-60180
1979 ; 52p 5refs
For abstract, see Vols. 1-2, HS-026 428--HS-026 429.
Availability: NTIS

HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT

The nature and extent of legislative and regulatory incentives and barriers to the coordination of transportation services for the elderly and the handicapped are examined. In the context of the report, coordination of transportation means sharing existing transportation resources through interagency cooperative agreements. Federal statutes and related regulations are analyzed to discover the incentives or barriers to coordination found in requirements which are related to funding, planning and the provision of transportation services.

by Delores A. Cutler
Ecosometrics, Inc., 4715 Cordell Ave., Bethesda, Md. 20014
DOT-OS-60180
1979 ; 151p refs
Executive Summary is HS-026 427; Vol. 2 is HS-026 429.
Availability: NTIS

HS-026 429

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT

A model billing and accounting system, useful to local agencies and organizations attempting to coordinate their transportation services, addresses the common administrative problems (and barriers to coordination) of accounting, allocation/billing, and certification of funding sources. In addition, an analysis of the federal regulations pertaining to fiscal management procedures is provided. Appended are uniform Federal administrative requirements and cost principles, analysis of regulations on uniform administrative requirements, and interviews conducted at the Federal level.

by Sue F. Knapp
Ecosometrics, Inc., 4715 Cordell Ave., Bethesda, Md. 20014
DOT-OS-60180
1979 ; 127p 1ref
Executive Summary is HS-026 427; Vol. 1 is HS-026 428.
Availability: NTIS

HS-026 430

CANADIANS LEARN TO LIVE WITH SEAT BELTS

Use of safety belt systems became mandatory in Ontario and Quebec in 1976 and in Saskatchewan and British Columbia in Oct 1977. These provinces represent a substantial majority of the Canadian population. A "get acquainted" period was observed in each province, featuring extensive educational campaigns with minimal enforcement. A gradual shift in public attitudes toward safety belts has been noted. Agencies promoting safety belt legislation over the years are the New Brunswick Safety Council (sponsoring a high school seminar on safety); the Conservative government of Premier Lougheed (press release on needless highway fatalities); the Edmonton Journal (editorial); and the Medical Assoc., the Motor Assoc., and the Safety Council of Alberta. A growth in seat belt use was noted in New Brunswick from 29% (Mar 1977) to 33% before legislation took effect, to 72% after legislation was implemented (Nov 1977-Mar 1978). In Dec 1978, overall compliance was estimated at 80%. Elements in the success of the program included a low-key educational advertising campaign, an information center, and a speakers bureau. Another factor was a crash simulator, the "Seat-Belt Convincer," which demonstrated the effects of a 6 mph crash. A 1978 Ontario government study projected a 21.6% decrease in hospital in-patient care, a 14.7% decrease in emergency outpatients, a 15.3% decrease in therapy treatment, and a 16.2% decrease in medical fees as a result of increased seat belt use. The average cost of medical treatment, broken down by seat belt usage in vehicles involved in accidents, was $228 where seat belts were installed and used, and $445 where seat belts were not installed. (The above figures were somewhat obscured by simultaneous reduction in speed limits in British Columbia and Ontario.) A greater interest has been noted in the use of car seats for babies, in spite of the high cost, due in part to rigid government standards. A car seat made in Australia for children between three and ten was promoted so successfully that local production in Canada and the U.S. is being arranged.

by P. G. Green
Publ: Traffic Safety v79 n6 p16-8, 27 (Jun 1979)
1979 ; 1ref
Availability: See publication

HS-026 431

OPTIMIZATION OF DIESEL COMBUSTION RESEARCH

Some philosophical guidelines are presented on the objectives of engineering research and the mental processes of research are outlined: observation of phenomena, building of the physical model, and quantitative or mathematical description and validation of the model. The combustion process is discussed as a link between design and performance, including the following aspects of engine performance: fuel injection characteristics; power and cycle efficiency (peak cylinder pressure and heat release); emissions (nitric oxide, hydrocarbons, carbon monoxide, and particulates, control of white or blue smoke); mechanical aspects of noise, engine stressing and durability; cold starting; and fuel variation.

by W. T. Lyn
Cummins Engine Co.
Rept. No. SAE-SP-433 ; 1978 ; 14p 7refs
Horning Memorial Award Lecture.
Availability: SAE

best copy available

HS-026 432

SHARP INCREASE IN DEATHS, NHTSA ADMINISTRATOR SAYS

Administrator Claybrook stated that the number of traffic fatalities is increasing faster than the number of registered vehicles, miles travelled, drivers licensed, and the U.S. population. The statement, which was excerpted and paraphrased, was made when four reports were released, including a 1975-1978 study of trends in the Fatal Accident Reporting System, which identifies the types of vehicles primarily involved in the increase in traffic fatalities. Remedies suggested include motorcycle safety, improved safety features in vans and in light and heavy trucks, and enforcement of the 55 mph national speed limit, especially in the western-southwestern states. Other reports released were preliminary findings from the National Crash Severity Study (NCSS) which identifies the type of injury, type of crash, vehicle speed, and other factors; the Five Year Plan for Vehicle Rulemaking; and a progress report that discusses what the industry is doing to meet Federal requirements for automatic belts and air bags, as well as agency programs to increase safety belt use. The NCSS file indicates that people involved in serious accidents use safety belts 8.4% of the time, a usage rate 40% lower than that of the general driving population. The NCSS file also shows that nearly a third of automobile accident fatalities occur when occupants are ejected from the car, especially in rollover and side impact collisions, and that over 90% of the serious injuries and fatalities in side crashes occur when the occupant compartment is damaged. Priority areas in the Five Year Plan include automatic belts or air bags, reducing pedestrian fatalities, extending motor vehicle standards to cover trucks and vans, improving braking requirements for all vehicles, and motorcycle safety. Heavy truck safety improvements will include rear underride protection, and improvements in fields of view, interior noise level, fuel system integrity, and ride quality.

Publ: Traffic Safety v79 n6 p6, 26 (Jun 1979)
1979 ; 1ref
Availability: See publication

HS-026 433

EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS

A group of postpartum women participated in each of three in-hospital education programs designed to increase the crash protection of infants in cars. One program distributed literature and made infant carriers readily accessible and convenient to purchase; another program provided literature and a personal discussion, as well as making infant carriers easy to purchase; the third program provided literature and offered a free carrier. The programs increased the use of infant carriers but had little or no effect on use of infant carriers fastened by a seat belt to provide crash protection. Among the methods suggested for increasing proper use of infant carriers are mandatory restraint laws and passive restraints. Increased protection for children, many of whom ride in the rear seat, could be achieved by increased crash padding of vehicle interiors.

by Keith S. Reisinger; Allan F. Williams
Publ: Pediatrics v62 n3 p280-7 (Sep 1978)
1978 ; 32refs
Sponsored by Insurance Inst. for Hwy. Safety.
Availability: See publication; Insurance Inst. for Hwy. Safety, Watergate 600, Suite 300, Washington, D.C. 20037

HS-026 434

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS

A Dept. of Transportation (DOT) 1977 survey of premium rate changes from 1971 to 1977 in the 16 no-fault states and in representative states without no-fault laws indicated that premiums rose significantly in current dollars in virtually all cases, rural and urban, fault and no-fault; in constant dollars, most premiums decreased; and premiums in certain urban areas increased sharply, even after adjusting for inflation, in both fault and no-fault states. When adjusted for inflation, rates either held steady or dropped in Michigan, the state with a plan most resembling that proposed in the original DOT Auto Insurance Report. A Rutgers Law Review study evaluated the cost/benefit performances of the various state no-fault laws, and concluded that the no-fault benefits provided by add-on plans have been provided at significant additional cost. This type of no-fault plan is therefore unsuccessful in providing benefits at traditional fault-based insurance premium levels. In high benefit states (Colorado, New Jersey, New York, and Pennsylvania), total bodily injury premium levels increased by a mean of 15% and a median of 13%. In Michigan, an 11% decrease in total bodily injury premiums was noted, due to the state's practice of barring tort claims for pain and suffering. Examples are cited of the cost effectiveness of extraordinary expenses paid for by insurers in New Jersey. Advantages of no-fault insurance include greater benefits, more in keeping with actual losses, and more prompt payment, as well as compensation for losses and injury in one-car accidents, previously uncompensated. The 1977 DOT study concluded that state experience with no-fault automobile insurance would appear to confirm the basic soundness of the theory and the feasibility of the theory's implementation; that no-fault plans of sharply varying objectives and character are widely seen as successes; and that no problem has arisen in the implementation of no-fault for which there does not appear to be a readily available and feasible solution, given the political will to make the necessary change.

by Jeffrey O'Connell; Janet Beck
Publ: Best's Review v80 n2 p24, 26, 28, 86-8 (Jun 1979)
1979 ; 4refs
Based on paper in Mar 1979 Insurance Law Journal.
Availability: See publication

HS-026 435

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS

To aid in computational analysis for low-cost freeway incident management, values are presented of actual observed getaway flow rates from traffic incidents and geometric bottlenecks. Previously gathered data were used from three freeways in Los Angeles, Calif., and further data were gathered from the Washington, D.C. I-495 Beltway. Los Angeles data were collected from loop sensors imbedded in the freeway lanes and connected to a central computer. Washington D.C. incident data were collected by manual traffic counts from a one-direction three-lane section noted for frequent traffic incidents; bottleneck data were gathered at three locations. Analyses of both manual- and computer-detected freeway data showed that two distinct getaway flow rates exist: one for freeway incidents, the other for geometric bottlenecks. A reasonable value for the former rate is considered to be 1500 vehicles/lane/hour (v/l/h) although it varies from 1100 to 1900 v/l/h. The rate is slightly dependent upon incident type and number of vehicles involved, as well as traffic conditions (peak or off-peak). The geometric bottleneck getaway flow rate, involving the loss of more than one lane, is 2000 v/l/h, or approximately the freeway's capacity.

by Jeffrey A. Lindley; Samuel C. Tignor
Federal Hwy. Administration, Traffic Systems Div., Washington, D.C. 20590
Publ: Public Roads v43 n1 p1-7 (Jun 1979)
1979 ; 5refs
Availability: See publication

HS-026 436

HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS

Major findings are reported of research concerning the influence of the driver, vehicle, and roadside characteristics on the hazards of run-off-road (single-vehicle) accidents. Data were gathered on almost 8000 accidents in 1975-1976 by specially trained state police officers in Wyoming, South Dakota, Maine, Tennessee, Georgia, and California on noninterstate rural highways. Data are tabulated and discussed for accident frequencies for horizontal alignment by roadway type; accident frequency in relation to distance from previous horizontal curve, and from vertical curve; accident frequency and severity by vertical alignment; and severity of injury by horizontal alignment. Roadside factors were studied in terms of three basic off-road vehicle behaviors: rollover, nonroll impact, and no impact until a later road departure. Rollovers were more likely to occur on roads built on fill than on ditch cut roads; ditches, embankments, and culverts were overrepresented in nonroll impacts on ditch cut roads, with higher injury rate for deeper ditches. The most frequently struck objects in nonroll impacts were single trees, fences, wooden utility poles, embankments, ditches, guardrails, culverts, and small trees and brush. A large variation was found in angle of impact for guardrails (median of 9-11 degrees). Data are tabulated and discussed for vehicle behavior in striking guardrails and resultant driver injury, and driver injury by type of guardrail in primary impacts. An attempt was made to estimate the probable effect of roadside clear zones. Among miscellaneous safety features discussed, were curve delineation, center lines, improved light conditions, and curve warning signs, as well as increased shoulder width. Occupant ejection was considered the greatest determinant of injury; the injury rate was high for compounded or extended rollovers, and for striking nonyielding objects, injury rates increasing with increased speeds; injury rates were higher for frontal impacts in nonroll accidents. Other important injury factors were (in descending order) intoxication level, pole offset, passenger restraint use, horizontal curve length, predeparture maneuver, departure angle, driver condition, road condition, and distance from origin of tire marks to the departure point. These factors are divided equally among wholly driver determined, behavioral (interactions between driver and roadway), and roadway determined. The factors for which the driver is responsible are more statistically significant on injury than those under the control of the highway engineer.

by C. P. Brinkman; K. Perchonok
Federal Hwy. Administration, Environmental Design and Control Div.; Calspan Field Services Inc.
Publ: Public Roads v43 n1 p8-14 (Jun 1979)
1979 ; 1ref
Summary of a 2-Vol. rept. with the same title (FHWA-RD-78-201 and -202) by K. Perchonok, et al.
Availability: See publication

HS-026 437

THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS

Visibility and the related measurements of legibility and conspicuity are defined, and the improvement in highway visibility brought on by recent research is discussed, especially that sponsored by Federal Hwy. Administration programs. Laboratory studies have indicated that visual performance depends on the following factors: luminance adaptation level to which the eye is previously exposed, size and shape of the object to be seen, time of viewing, and contrast between the object and the background. Factors affecting driving steering control under adverse visibility conditions include illumination sources (natural or artificial); atmosphere characteristics (attenuating, scattering); driver vision, perception, and psychomotor skill; windshield properties; and road delineation. Among the experiments aimed at improving highway visibility are those with lighting (e.g. High Pressure Sodium vs. Mercury Lamp systems), both level and location, and pavement marking systems (paint color). Much of the research on sign visibility concerns legibility. Future research areas include the interaction of conspicuity and legibility of signs, interactive effects between methods used to enhance visibility, driver control loss brought on by poor visibility, and relationship of visual conditions along the highway and "highway effectiveness" measures.

by Donald A. Gordon; Richard N. Schwab
Federal Hwy. Administration, Office of Res., Washington, D.C. 20590
Publ: Public Roads v43 n1 p15-22 (Jun 1979)
1979 ; 17refs
Availability: See publication

HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT

A survey was conducted of the state of the art of automatic vehicle monitoring (AVM) systems and their use in public transit, taxi, and police operations. The systems identified are applicable to improving operational efficiency and quality of service. The various system elements related to AVM systems were reviewed, including vehicle location, identification and monitoring, computer scheduling, computer dispatch, silent alarms, security alarms, mechanical alarms, on-board readout, real-time display, passenger counting, management reporting, and digital data hardware. It was concluded that electronic vehicle monitoring increases service and efficiency in transportation systems; that some direct cost savings may be achieved in some communities; that AVM systems increase passenger safety; that data collection and retrieval capability provides information vital to increased operational efficiency; that an adequate supply of tested hardware components is available but increased costs for software offset reduced cost of electronic hardware; and that careful planning and personnel training are essential prior to system implementation. An in-depth study and demonstration program are recommended to develop a set of guide lines and/ or criteria for determining the need of Digital Data Communication systems under varying levels of transit demand and system characteristics, in order to establish the ranges of various parameters for assessing the cost/effectiveness of AVM systems. It is recommended that before selecting any particular AVM configuration, key personnel visit a location with a recently implemented system, for first hand observation and discussion of possible problems. Appended is a description of the E-Systems Mobile Digital Terminal 800.

by Tapan K. Datta; Brian L. Bowman; Michael J. Cynecki
Wayne State Univ., Dept. of Civil Engineering, 667 Merrick, Detroit, Mich. 48202
Rept. No. UM-HSRI-78-44-2 ; 1978 ; 155p 69refs
Sponsored by the Michigan State Hwy. Commission. Cover title: Applicability of Digital Data Communication Features in Public Transit Systems: Technology Assessment.
Availability: Michigan Transportation Res. Program, Hwy. Safety Res. Inst., Univ. of Michigan, 2901 Baxter Rd., Ann Arbor, Mich. 48109

HS-026 439

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.

by Tapan K. Datta; Brian L. Bowman; Michael J. Cynecki
Wayne State Univ., Dept. of Civil Engineering, 667 Merrick, Detroit, Mich. 48202
Rept. No. UM-HSRI-78-44-1 ; 1978 ; 27p
Sponsored by the Michigan State Hwy. Commission. Cover title: Applicability of Digital Data Communication Features in Public Transit Systems: Executive Summary. For abstract, see HS-026 438.
Availability: Michigan Transportation Res. Program, Hwy. Safety Res. Inst., Univ. of Michigan, 2901 Baxter Rd., Ann Arbor, Mich. 48109

HS-026 440

AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN

An analysis of tire procurement practices indicates that significant annual operating cost savings appear possible for four Michigan public transit authorities if they switch from leasing to purchasing tires. Further in-depth analyses of bus tire leasing costs appear to be warranted. An immediate switch from tire leasing to purchasing would require the purchase of all tires currently on buses and in spare inventory. Such a purchase could cause cash flow problems in Michigan public transit authorities' operating budgets. Outside funding from state or Federal sources for initial tire purchases could facilitate the changeover from leasing to purchasing. Rigorous tire inspection and maintenance (I/M) programs are necessary to maximize tire tread and carcass life; I/M provisions in tire lease contracts may contribute to extended life. Significant annual tire use cost savings appear possible through maximizing the use of recapped tires on bus traction axles. A detailed evaluation of the safety and performance experience of those Michigan public transit authorities currently using recapped tires would be helpful in providing data for the various transit authorities, some of which oppose the use of recapped tires for safety and operating reasons. Recapping of worn bus tires is the most cost-effective and energy-efficient means of recycling bus tires. Other recycling technologies include use as boiler fuel; chemical or pyrolytic decomposition as a source of rubber for new tires, or as a source of petroleum fuels and high BTU gas; use as a component of paving asphalt; and use in breakwaters or artificial reefs.

by James L. Dries
University of Michigan, Hwy. Safety Res. Inst., Michigan Transportation Res. Prog., 2901 Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-78-35 ; 1978 ; 33p 30refs
Sponsored by Michigan Dept. of State Highways and Transportation.
Availability: Corporate author

HS-026 441

THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT

The availability of various alternative fuels (hydrogen (liquid and gaseous), alcohols (methanol, ethanol, and blends), broadcut and/or synthetic fuels, gasoline/alcohol blends) for public transit vehicles is examined, and funding opportunities for demonstration grants are discussed. The only alternative fuels that appear to be likely candidates for a demonstration grant in the near term are alcohol and synthetic fuels. The only likely supporter of a demonstration project is the Dept. of Energy, Div. of Transportation Energy Conservation, which has tentative plans for supporting some demonstration programs of alcohol/gasoline blends in the near future. It is recommended that there be a plan for a public transit demonstration project using alcohol in Michigan. The preferred alcohol would be methanol. Recommendations concerning such a project are provided, including construction and operation of a methanol pilot plant using forest product biomass and solid waste.

by Howard M. Bunch
University of Michigan, Hwy. Safety Res. Inst., Michigan Transportation Res. Prog., 2901 Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-78-33 ; 1978 ; 37p 51refs
Sponsored by Michigan Dept. of State Highways and Transportation.
Availability: Corporate author

HS-026 442

ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT

Analysis of the 1976 and 1977 NEISS (National Electronic Injury Surveillance System) data on bicycle accidents has revealed little change in general patterns since 1975. The most evident feature is the large seasonal effect, while a small (not statistically significant) monthly increase in accidents is also noted, as is a slight shift to older ages for persons involved in bicycle-associated accidents. Although only about 3% of bicycle accidents investigated in depth occurred at night (midnight to 7 AM), these accidents were more likely to involve motor vehicles. These nighttime accidents resulted in more serious injuries than did most of the accidents investigated in depth. While bicycle use at night seems to be rare, bicycles ridden at night should have adequate illumination, and bicyclists should take extra precautions, since motorists do not expect to encounter bicyclists at night. A standard summary, developed earlier, is provided for bicycle-associated accidents reported through NEISS for the 1975-1976 period, as well as analyses of data from selected in-depth investigations.

by Jairus D. Flora, Jr.; Paula Beitler; Richard J. Kaplan
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-78-64 ; 1978 ; 42p
Rept. for Apr 1977-Jun 1978. Sponsored by Bicycle Manufacturers Assoc.
Availability: Corporate author

HS-026 443

AN AGE ANALYSIS OF TRAFFIC ACCIDENTS AND OFFENCES

Each category of traffic offense has been analyzed to determine the frequency of offenses per 1000 South Australian drivers in each five-year age bracket from 16-20 to 91-95 from Jul 1971 to Jul 1975. Data for this period have been analyzed relating to the age distribution of road users killed or injured in accidents, and the involvement in or responsibility for accidents according to age and road-user class. The one conclusion drawn from the analysis is that driving skill declines with age. The implication is that unless older drivers adjust their driving to account for their reduced skills, they are placing themselves and others at increasing risk. The need for retesting of older drivers has already been recognized in South Australia. Any driver over the age of 70 has to undergo a practical test before a new license is issued, the license being issued for a year instead of for three-years. An eyesight test is also introduced for drivers of 75 years of age. This system of retesting is a valuable basic appraisal of driving skill; the question remains whether more specialized forms of testing are necessary to identify a decline in specific skills.

by A. K. Johinke
Road Traffic Board of South Australia, Box 19, P.O. Walkerville, S.A. 5081, Australia
1977 ; 36p
Presented at 13th Annual Conference of Australian Assoc. of Gerontology, 1977.
Availability: Corporate author

HS-026 444

PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA

A general background is provided for techniques developed to generate input data sets for the ATB (Articulated Total Body) Model program from anthropometric data. The ATB Model was developed from the 3-D Crash Victim Simulator Model under the sponsorship of the Aerospace Medical Res. Labs. specifically for application to aerospace-type problems. The program simulates the dynamics of body motion using a unique method that has been shown to be equivalent to the Lagrange method. Motion picture films of the dynamics can be produced through the use of plot packages supplied with the simulation program. Techniques are described which were developed to generate body segment inertial data, to estimate joint locations and segment contact ellipsoids, and to define body and joint axes orientation. The state of the art of implementing these techniques is mentioned. Anthropometric data required for each of the body segments are appended, as well as expressions for the inertial properties of a simply-transected elliptical cylinder and of a simply-transected elliptical semicylinder with the surface curve removed.

by Duane G. Leet
University of Dayton Res. Inst., 300 College Park, Dayton, Ohio 45469
F33615-75-C-5054; F33615-78-C-0504
Rept. No. AMRL-TR-78-99; AD-A062 118 ; 1978 ; 51p 14refs
Prepared for presentation at 35th AGARD AMP Business Meeting/Specialists' Meeting, Paris, 6-10 Nov 1978.
Availability: NTIS

HS-026 445

FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN

A comparative study is presented of child motor vehicle accident fatalities for the Australian states. The Australian traffic accident fatality rate for children (0-14 year age group) is 10.33 per 100,000 population at risk, a very high rate for the Western world. Age (0-4, 5-9, 10-14, and 15-and-over age groups) and sex-specific rates by states are tabulated. Fatality data are also compiled for two specific types of fatal traffic accidents involving children, run-down (pedestrian) and inter-vehicle accidents. Preventive strategies selectively directed towards these types of accidents are indicated. Further enforcement of seat belt legislation for children might be particularly effective in Tasmania and Queensland where there are high inter-vehicle fatality rates involving children. Comparative statistics for pedestrian fatalities show quite different patterns from those for vehicle occupants. Surprisingly, pedestrian fatality rates do not appear to be related to population density. Figures from Tansmania and Western Australia are high, and those from Victoria low. The higher figures for the less densely populated states may be mainly the result of an inverse relationship between vehicle speed and population density. The ineffectiveness of traditional safety campaigns to alter age-specific behavior to reduce pedestrian accidents is cited. More rigid control of vehicle speeds and improvement of visibility in dangerous sites are recommended. It is emphasized that no state should accept a child fatality rate greater than 3.0 per 100,000 population at risk for pedestrian or inter-vehicle accidents. This figure is now exceeded by five states for the former, and four states for the latter accident types.

by J. H. Pearn
Publ: Australian Paediatrics Journal v14 p74-7 (Jun 1978)
1978 ; 15refs
Availability: See publication

HS-026 446

FOCUS ON FACILITIES. SOME CURRENT THINKING ON "WHERE WE ARE" AND "WHERE ARE WE GOING?" [BICYCLING]

Telephone interviews were conducted with ten experienced bicycle facilities people concerning present bicycle planning directions. The persons interviewed offered a wide range of opinion based on involvement in government, academia, industry, and interest groups. An element of geographic bias was evident, as most participants came from coastal locations, with the Washington, D.C. and Portland-Eugene areas well-represented. The respondents' views are summarized. The discussions revolved about open-ended questions covering the following areas: the recent shift from bikeways as solution to an emphasis on education, and possible future trends; the optimum area for improving facilities in the broadest sense; statement of a case for facilities; role of facilities in increasing bicycle awareness; facilities that have worked; and further thoughts on facilities. Among the facilities discussed were operating space for bicyclists on arterial streets, better lighting, separate bikeways, lockers and showers.

by Josh Lehman
Publ: Bicycle Forum n3 p20-3 (1979)
1979
See also HS-026 457 and HS-026 458.
Availability: See publication

HS-026 447

COLLISIONS WITH UTILITY POLES

A detailed investigation of utility pole collisions is described, with particular emphasis on the engineering aspects of the accident sequence. Detailed measurements of site characteristics were made for 879 pole collisions resulting in vehicle disablement which occurred in the Melbourne metropolitan area (Victoria, Australia), and for a control group of 793 randomly-selected pole sites. These data led to the construction of an accident predictor model for estimating the annual number of accidents at a pole site from simple site measurements. It was determined that site characteristics associated with 50% of pole accidents on major roads, and 75% of accidents on minor roads, are associated with only 10% of the total pole population for these road classes. From accident records and other data, it was estimated that pole collisions result in 45 fatalities and 785 injured persons annually in Melbourne. Data from the accident-involved vehicles, compared with those from a control group of 627 randomly-selected vehicles, indicated that tire tread depths below 3 mm result in a progressive increase in accident involvement, as do deviations from specified tire inflation pressures and pavement skid resistance below 50. A strong correlation was found between injury severity and occupant compartment intrusion. Although side impacts are generally the most severe, the great majority of injuries result from frontal collisions because of their greater frequency. It was determined that when loss of societal welfare is measured in terms of current resource consumption and lost production, pole accidents in Melbourne cost at least $23 million annually. Benefit-cost analyses for various technical means of reducing accident occurrence or severity (breakaway or wrap-around luminaire supports, underground cables, offset poles) demonstrate the need for immediate remedial action.

by J. C. Fox; M. C. Good; P. N. Joubert
University of Melbourne, Dept. of Mechanical Engineering,
Parkville, Melbourne, Vic. 3052, Australia
Rept. No. CR-1 ; 1979 ; 441p 194refs
Sponsored by Commonwealth Dept. of Transport, Office of Road Safety (Australia). For summary report, see HS-026 448.
Availability: Road Safety Information Service, G.P.O. Box 1839Q, Melbourne, Vic. 3001, Australia

HS-026 448

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT

by J. C. Fox; M. C. Good; P. N. Joubert
University of Melbourne, Dept. of Mechanical Engineering,
Parkville, Melbourne, Vic. 3052, Australia
Rept. No. CR-2 ; 1979 ; 39p 4refs
Sponsored by Commonwealth Dept. of Transport, Office of Road Safety (Australia). For abstract, see HS-026 447.
Availability: Road Safety Information Service, G.P.O. 1839Q, Melbourne, Vic. 3001, Australia

HS-026 449

HIGHWAY STATISTICS 1977

This compilation tabulates 1977 analyzed statistics on U.S. highway transportation covering the following areas of general interest: motor fuel, motor vehicles, driver licensing, highway-user taxation, state highway finance, highway mileage, and Federal aid for highways. Also presented are 1976 highway finance data for municipalities, counties, townships, and other units of local government. A listing of the data is given in the table of contents, and a brief description provided in the text accompanying each section. A brief section provides statistics for American Samoa, Guam, and the Commonwealth of Puerto Rico. A directory of additional data sources is provided, including suggestions for locating and obtaining transportation related statistics.

Federal Hwy. Administration, Hwy. Statistics Div.,
Washington, D.C. 20590
Rept. No. FHWA-HP-HS-77; AR-33 ; 1978? ; 311p refs
Availability: GPO, stock no. 050-001-00142-0

HS-026 450

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME

A chassis frame, for a 1979 Ford LTD experimental vehicle, was designed and fabricated in graphite fiber-reinforced plastic (GrFRP). Prototype composite molding techniques were employed to form the closed frame sections required for strength and stiffness. Weight savings were realized because of both component integration and material substitution. Compared with its steel counterpart, the GrRFP frame affords a 79 lb (27.7%) weight reduction while providing a 33% increase in torsional stiffness and a 16% increase in bending stiffness. The frame passed laboratory suspension and steering load tests and has been incorporated in the experimental vehicle, but has not yet been vehicle tested.

by D. R. Sidwell; R. D. Torczyner; Derek Yates; M. B. Motwani; J. L. Thoms
Merlin Technologies, Inc.; Ford Motor Co.
Rept. No. SAE-790030 ; 1979 ; 8p
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. See also HS-026 451.
Availability: SAE

HS-026 451

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES

The design and fabrication of components of the 1979 Ford LTD experimental vehicle using graphite fiber-reinforced plastic (GrFRP), a material offering weight reduction (through material substitution, design changes, and part integration), are described in two parts. The design, finite-element analysis, and fabrication of the GrFRP for the concept vehicle body are described in Pt. 1. For the body-in-white, 104 steel parts, weighing 423 lb, were replaced by 41 GrFRP parts, weighing 160 lb, for a 62% weight reduction. The floor and body side panels represent some of the largest and most complex GrFRP automotive parts produced to date. The methodology and analysis used in developing the graphite composite lay-up design of the front end for the concept vehicle are outlined in Pt. 2. This assembly of GrFRP components weighs 30 lb, compared with 95 lb for the steel counterparts, and represents a 68% weight reduction.

by R. E. Bonnett; H. Kulkarni; G. Lim; P. Beardmore; R. Knight
Ford Motor Co.; Vought Corp.
Rept. No. SAE-790031 ; 1979 ; 12p
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. See also HS-026 450.
Availability: SAE

HS-026 452

TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS

Educational and medical countermeasures to prevent highway deaths and injuries, and postcrash rehabilitative services are addressed. As driver and traffic safety education programs for the novice are essential, it seems important to have periodic refresher courses, especially for those who have not driven for awhile. A medical exam might prove helpful to identify physical or mental deficiencies which could restrict an applicant's ability to drive safely. The practicing physician should become more cognizant of the need for critical evaluation of a driver's psychological and physical health; possible safety problems should be referred to the state medical advisory board for a decision. Great efforts to educate members of the various medical professions and the public are being made through such organizations as the American Medical Assoc., the American Acad. of Orthopedic Surgeons, and the International Assoc. for Accident and Traffic Medicine. Emergency medical services personnel are involved in detecting and reporting traffic accidents, rendering emergency care, and transporting the injured to hospitals. Rehabilitation programs for the physically disabled after an accident can provide job opportunities and enable these individuals to once again become productive citizens. The use of driving simulators in medical rehabilitation facilities is recommended. It remains to be determined which persons are unsafe drivers, due to the complex interaction of such factors as age, chronic disease, and prescription drug use, as well as non-medical factors.

by Daniel E. Della-Giustina
Publ: Emergency Product News v9 n10 p28-9 (Dec 1977)
1977 ; 2refs
Availability: See publication

HS-026 453

GASOHOL TEST PROGRAM

A test program evaluated the effect of gasohol on emissions (evaporative and exhaust) when used as an automotive fuel. Gasohol fuels increased evaporative HC (hydrocarbon) emissions an average of 49% to 62% on 11 vehicles tested (4 three-way systems and 7 oxidation catalyst systems). Two mixed gasohol fuels (gasoline mixed with 10% ethanol) decreased exhaust HC by about 9% on all vehicles. A blended gasohol fuel (gasoline blended with 10% ethanol for correct volatility) increased exhaust HC by an average of 24% on all vehicles. Total HC for 3.3 trips/day increased 11% to 32% with gasohol fuels. Evaporative emissions contained about 0.6 g ethanol and 3.3 g to 5.4 g HC (as $CH_{1.85}$) with gasohol fuels. Carbon monoxide emissions decreased 20% to 34% with gasohol fuels, and nitrogen oxides emissions increased 6% to 11%. Fuel economy (by carbon balance) decreased 1% to 5% with gasohol fuels. Driveability complaints increased with gasohol fuels. Three-way catalyst systems were not appreciably different from oxidation catalyst systems in exhaust and evaporative emission sensitivity to gasohol fuels. It is not known if a gasoline fuel containing 10% ethanol can be commercially blended to match distillation characteristics of gasoline fuel containing no ethanol, nor is it known if a "blended" gasohol with volatility characteristics similar to a gasoline would give driveability or evaporative emission levels similar to the gasoline. Appended are a listing of the test procedure, typical fuel inspection data, vehicle specification sheets, and test result tables.

by Richard Lawrence
Environmental Protection Agency, Motor Vehicle Emission Lab., 2565 Plymouth Rd., Ann Arbor, Mich. 48105
Rept. No. PB-290 569; EPA-79-4A ; 1978 ; 45p 1ref
Availability: NTIS

HS-026 454

TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS

In view of the available scientific knowledge, the question is asked why the possible 80% elimination of the present automobile fatalities in the U.S., is not realized. The answer is framed in terms of two models of hazard and hazard control (one developed at Clark Univ., the other by Dr. w. Haddon of the Insurance Inst. for Hwy. Safety). Each model envisions stages of hazard development over time, starting with early and fundamental "causes", continuing through intermediate stages, and leading finally to consequences. The models define the structure of hazard causality and the range of control actions available to managers. When the history of auto hazard management in the U.S. is examined in the context of these models, it is concluded that driving risks could be reduced as much as five-fold. The political crisis of the early 1960's (increase in death rate per vehicle mile for the first time in decades), which led to major Federal intervention in 1966, was as much a crisis of increased driving and of demographics as a crisis of inadequate safety management. Actual improvements in safety since 1966 have been far less than those theoretically achievable, the failures being political failures. Failure can be attributed not only to the weakness of the Federal bureaucracy in the face of industry pressure, the direct interference of the President, and an indifferent public; it also is rooted in the persistence of the preconceptions that dominated pre-1966 hazard management philosophy. Since 1966, much more emphasis has been placed on the later stages of hazard management (i.e. crash and post-crash phases). The 1966 changes (brought about by the Highway Safety Act, and the National Traffic and Motor Vehicle Safety Act), may simply need more time to be absorbed. The final prognosis, however, is not a hopeful one; much improvement in hazard management will, as in the past, be vitiated by the risks created by increased driving and may, because of the introduction of smaller, less crashworthy cars, even exceed present loss projections.

by Thomas Bick; Christoph Hohenemser; Robert Kates
NSF-ENV-77-15334-PT-2
Publ: Environment v21 n2 p6-15, 29-30, 32-8 (Mar 1979)
1979 ; refs
Pt 1 is HS-025 841.
Availability: See publication

HS-026 455

THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS

A new energy model for the U.S. has been completed and tested which uses more recent fuel and energy data than the 1976 Gulf Oil Co./Stanford Res. Inst. data base and which calculates transportation energy flows and pricing through the year 2020. This equilibirum or "balance of forces" type of model calculates a slow rise in prices for transportation fuels over the time period. Two import oil price situations, per barrel prices of $12.75 and $15.50, have been modeled. The model calculated that the higher price would result in the earlier introduction of synthetic fuels. It also showed that the alternative fuels methanol, electricity, and broadcut fuel could be economically competitive and thus enter the transportation market, while hydrogen could not.

by Carl J. Anderson
University of California, Lawrence Livermore Lab., Livermore, Calif. 94550
W-7405-ENG-48
Rept. No. UCRL-52558 ; 1978 ; 18p 9refs
Availability: NTIS

HS-026 456

MARIHUANA AND DRIVING HAZARDS

Evidence is drawn from 22 scientifically valid reports published in international journals showing the detrimental effect of marijuana use on traffic safety. Recent research indicates that cannabis (marijuana) use is positively associated with the traffic accident toll. In controlled laboratory studies, marijuana has also been shown to adversely affect perception skills, coordination, braking time and other motor skills, mood, judgment, etc. Driving studies (under controlled and normal traffic conditions), indicate that marijuana adversely affects driving safety. Appended are a summary of topics covered by the 1975 International Symposium on Drugs and Driving, held in Bloomington, Ind. and sponsored by the National Hwy. Traffic Safety Administration; and a list of literature reviews and bibliographies on the subject of drugs and driving.

by Gerald Milner
Publ: Medical Journal of Australia v1 n7 p208-11 (12 Feb 1977)
1977 ; 29refs
Availability: See publication

HS-026 457

A BICYCLE ACTIVIST LOOKS AT FACILITIES

In a discussion of bicycle facilities development in the U.S. from its first stage (construction of bikeways during the modern bike boom), through its second stage (experienced bicyclists wanting widened highways for bicycle and automobile traffic and bicycle parking) to the present, the third stage involves putting the improved facilities information to prudent use. The disparity in point of view between bicyclists and the facilities provisioners is seen as the prominent characteristic of this third stage. Access to roads, road engineering to accommodate bicycles, parking and storage, and interface with public transport are individually addressed as the four essential bicyclists needs. Supplemental comments are made in support of the use of recreational department budgets for creation of recreational bicycling facilities (i.e. bikepaths in parks), and the appointment of active bicyclists to facilities provision positions or any other aspect of bicycle programming.

by Darryl Skrabak
Publ: Bicycle Forum n3 p14-6 (1979)
1979 ; 2refs
See also HS-026 446 and HS-026 458.
Availability: See publication

HS-026 458

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION

A hypothetical bicycle facility project failure is described which points to the need for an educational program to overcome many problems faced by bicycle facility engineers and planners. Educational requirements to update planners' and engineers' thinking are addressed: the need to realize that bicyclists are not a homogeneous group; the need to include bicycle transportation as part of planning and engineering curricula; and the need to keep informed of the latest bicycle transportation planning and design developments. The American Assoc. of State Hwy. and Transportation Officials' (AASHTO) "Guide for Bicycle Routes" (1974) is described, including an outline of some of its outdated aspects (no discussion of different types of bicycle user groups, some design alternatives found to be undesirable). The Federal Hwy. Administration's (FHWA) great contributions, since 1974, to the knowledge of planning, design, and construction of bicycle facilities are acknowledged. Reliance on the AASHTO Guide prevails because newer information and research results are seldom circulated to persons directly responsible for planning, design, and construction. The passage of the 1978 Highway Act is expected to change this situation. The FHWA is to develop a design guide including criteria for bicycle facilities which will provide adequate roadway space and convenient bicycle travel, secure bicycle parking at major destinations, a good riding environment in residential areas, and independent bikeways. The most current state-of-the-art document, the California Dept. of Transportation's "Planning and Design Criteria for Bikeways in California" is recommended.

by Alex Sorton
Publ: Bicycle Forum n3 p17-9, 38 (1979)
1979 ; 18refs
See also HS-026 446 and HS-026 457.
Availability: See publication

HS-026 459

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES

Based on three earlier tire/road noise studies (cooperative projects between IFM Akustikbyran A.B., and Statens Vag- och Trafikinstitut (VTT), and sponsored by the National Swedish Board for Technical Devel.), analyses are made of correlations between exterior tire noise and road roughness (texture). Measured tire noise frequency spectra for a passenger car tire and a truck tire rolling on three road surfaces were analyzed, as well as frequency spectra of the longitudinal surface profile curves recorded by a profilometer for the corresponding road surfaces. A distinct correlation is found between these differential spectra for a radial passenger car tire with "summer" tread rolling on a rough-textured road, indicating that texture-induced tire vibrations are the dominating noise generation mechanism. Frequency response calculations (approximations) indicate that the tested passenger car is sensitive to road texture in the region from 125 Hz to 1000 Hz, corresponding to road irregularity wavelengths of 160 mm to 20 mm. The truck tire appears to be about as sensitive to road texture as the passenger car tire, if compensations are made for contact area differences. In theory, clearly detecting a frequency shift due to speed for texture-induced noise is possible only for a periodically grooved pavement and a smooth-patterned tire. Results suggest that a tire, with respect to texture-induced noise, can be considered as a filter; the filter model may be included in a more complex model explaining all tire noise generating mechanisms.

by Ulf Sandberg
Statens Vag- och Trafikinstitut (VTI), Fack, 58101 Linkoping, Sweden
Rept. No. VTI-174A ; 1979 ; 29p 9refs
Includes Swedish Summary.
Availability: Corporate author

HS-026 460

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION

Information on shock absorbers, obtained from Monroe engineers, is presented for the undercar service specialist. The function of a shock absorber is explained, and its structure illustrated. Diagnostic inspection procedures are outlined for determining whether shock absorbers need replacement. Information is given on how to select the type of unit (using the Monroe line of shock absorbers as examples) best suited to the needs and requirements of an individual driver and a particular vehicle. Installation advice is given, emphasizing the importance of following the instructions enclosed in the shock absorber carton and pointing out shock clearance problems when mounting heavy-duty shocks on downsized cars, particularly American makes cited (illustrations show areas where grinding or bending needs to be done). Some general installation tips are outlined. Special mention is made of load-leveling shock absorbers which, unlike other types, carry weight.

Publ: Brake and Front End v49 n6 p21-4, 26 (Jun 1979)
1979
Availability: See publication

HS-026 461

FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG

A comparision was made of five sports coupe models which were selected on the basis of offering a minimum of 20 mpg in the city cycle and of acceptability to the sports coupe enthusiast in handling, performance, technological sophistication, and style. The five choices of the "Car and Driver" (C/D) team were the Volkswagen Scirocco, Dodge Omni 024, Mazda 626, Mercury Capri, and Honda Prelude. The Scirocco, Omni, and Prelude have front-wheel drive, the Scirocco, Mazda, and Prelude have five-speed manual transmission, and each car is equipped (standard or optional) with a full complement of performance wheels, tires, and stripes. Vehicle specifications are tabulated: base and as-tested prices, engine, transmission, hp, torque, wheelbase, curb weight, suspension, steering, brakes, and tires. The C/D team of drivers evaluated the cars on a 500-mi trip over Michigan and Ohio Interstates and tortuous country roads in terms of fuel economy and driving enjoyment. Drivers changed cars at intervals and utilized a CB radio network. A performance comparison table provides data on acceleration, top speed, braking, maneuverability, interior sound level, and mpg. A photograph of each car is provided, as well as a summary of its advantages and disadvantages. The Omni was the overall mpg champ at 30, followed by the Scirocco and the Mazda tied at 28, the Prelude at 25, and the Capri at 20. All of the sports coupes were found "fun to drive".

by Mike Knepper
Publ: Car and Driver v25 n1 p55, 57, 59-60, 62 (Jul 1979)
1979 ; 1refs
Availability: See publication

HS-026 462

AUTOMOTIVE ELECTRONIC SYSTEMS

Fourteen papers are compiled, designed to bridge the communications gap between automotive engineer and electrical engineer and to promote a better understanding of electronic systems using custom integrated circuits and/or microcomputers. Papers are presented on the following topics: microprocessors, custom integration, application of custom integrated system, and microcomputer system applications.

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-440 ; 1979 ; 79p refs
Includes HS-026 463--HS-026 476.
Availability: SAE

HS-026 463

INTRODUCTION TO MICROPROCESSORS

The functions of the components of a microcomputer and their interactions are described. The microprocessor, clock, memory, and input/output section are defined and discussed. Definitions are given for microcomputer, microprocessor, single chip computer, custom integration, and minicomputer. The two types of primary memory (read/write and read only) are explained, including number systems and codes, and microcomputer software. The relationship of binary and hexadecimal numbers to machine language and assembly language programming is elucidated.

by Gene H. Miller
General Motors Inst., Electrical Engineering, Flint, Mich.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p1-5
Rept. No. SAE-790234 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 464

INTERFACING TO THE MICROPROCESSOR

The function of interfacing devices is explained. These devices, called busses (groups of signal wires with a common function), connect the memory and external devices to a microcomputer; the nature of the information transferred is described. A microprocessor is a single integrated circuit (IC) that implements the control unit and processor of a computer; most microprocessors communicate via three busses (address buss, data buss, control buss). Since it is not practical to extend the busses to devices external to the computer, an interface IC is used to route the proper information to the microprocessor at the correct time. These IC'S contain input ports, output registers, and flags. Both single-purpose and programmable interfacing IC'S are widely available. Memory mapped input/output hardware is very common in typical microcomputer applications, and both polling and interrupt techniques are frequently used.

by Gene H. Miller
General Motors Inst., Electrical Engineering, Flint, Mich.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p7-10
Rept. No. SAE-790235 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 465

MICROPROCESSOR SELECTION AND SOFTWARE DESIGN

Some of the parameters involved in selecting a microprocessor for a particular application are listed and their interrelationships discussed. The most important parameters are application-dependent and include number of inputs, number of outputs, required throughput, type of interfaces, and the total number of systems to be produced. Another set of parameters is microprocessor-dependent and includes instruction set, throughput, and hardware and software support. Parameters related to in-house hardware and software expertise must also be taken into account.

by Jim Wilson; Paul A. Wintz
Wintek Corp., Lafayette, Ind.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p11-3
Rept. No. SAE-790236 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 466

DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS

Approaches are discussed for programmers to use in protecting their software against flaws in the hardware system due to hostile automotive environment. Failure modes considered are random occurrences of noise spikes (noise "hits") causing false inputs or changes in the state of various memory elements of the automotive microcomputer. Various techniques for writing "fail-safe software" for these microcomputers are discussed. These structured programming techniques help reduce the probability of executing (or increase the probability of detecting) a "tight loop" which results in a lock-up condition. Graceful recovery (i.e. setting the system back into correct operation), once a system fault has been detected, is considered. Filtering to desensitize programs to noise inputs is mentioned, as well as the use of a dead-man timer to detect lock-up. The general techniques are illustrated through the use of an Intel 8048.

by Barry Yarkoni; John Wharton
Intel Corp.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p15-8
Rept. No. SAE-790237 ; 1979 ; 3refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 467

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET

The development of a custom MOS (metal oxide semiconductor) circuit is considered, with particular reference to the automotive market. Custom MOS, which may be a single chip or a multi-chip system, is a synergism between the end-product developer and the semiconductor technologist. The available production-tried processes are described for development of a custom circuit (P Channel MOS, N Channel MOS, and Complementary MOS). Cost, package constraints, input/output (I/O) considerations, complexity, and power are outlined as items to consider when partitioning (the key to a successful product). I/O voltage protection structures used in MOS design are considered. Custom MOS/LSI (large-scale integration) product development is traced from the identification of a need to customer acceptance (including a flow diagram). Some automotive applications for custom MOS are listed (e.g. speed control, engine control, accessory controllers, safety warnings).

by Dennis Morris
National Semiconductor Corp., Santa Clara, Calif.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p19-21
Rept. No. SAE-790238 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 468

STANDARDIZE OR CUSTOMIZE? WHY NOT DO BOTH [MICROCOMPUTERS]

The on-going event called the "microprocessor revolution" and its evolution toward total system integration or "system on silicon" are discussed. Integration of the computing system is considered, as well as of the controlling interfaces. The dilemma of using industry standard devices or of committing time and money to develop a custom device is addressed. MOS (metal oxide semiconductor) process technology advancements are allowing greater device densities on a silicon chip, which in turn are permitting increased functional integration. Microprocessors are giving way to microcomputers, which on a single chip contain mask programmed ROM (read only memory), RAM (random access memory), a timer, external interrupt hardware, on-board clock oscillator, and programmable input/output lines. Some microcomputers are expandable to include off-chip memory and peripherals. A new microcomputer has been designed to accomplish further levels of integration for unique control situations. The need to interface with the control environment and its impact on custom integration is the prime consideration for the architecture of the Motorola MC6805 single-chip microcomputer. The 6805 is designed to help bridge the gap of design time and investment capital that exists between standard microprocessors and custom-designed controllers.

by Jerry A. Michnal
Motorola Inc., Austin, Tex.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p23-4
Rept. No. SAE-790239 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 469

CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION

An overview is provided to the automotive system manager for selecting and developing a custom bipolar integrated circuit (IC) to meet a system need. It is first necessary to determine the cost/effectiveness of customizing a system vs. using standard, off-the-shelf components, as well as to determine the extent of system integration desired, the type of interconnect needed, and the constraints of semiconductor packaging. Available lead time must be determined, and electrical, environmental, and mechanical specification limits defined. Number of sources, and parts interchangeability need to be addressed. Once the decision has been made to customize, the next desired function must be achieved within an acceptable schedule. At this stage, the system manager shares some control over the success of his program with the semiconductor supplier. The basic development cycle consists of the following major steps: selection of semiconductor supplier, contract definition and negotiation, circuit design, breadboard, design review, circuit layout, layout review, mask making, pilot wafer run, device characterization, specification review, life test, and release to production. Reaching a successful conclusion requires considerable positive interaction between system manager and semiconductor supplier.

by William Maxwell
Sprague Electric Co., Worcester, Mass.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p25-30
Rept. No. SAE-790240 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 470

AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK

The application of microelectronic components to automotive electronic systems now appears capable of reaching the proportions predicted in the early 1970's, but the challenge is to achieve very high reliability under the severe conditions of the automotive environment. The continued growth of automotive applications may depend on resolution of reliability problems without significant add cost. State-of-the-art integrated circuits (IC'S) will work in automotive electronic products, but making them work will require substantial commitment by both the semiconductor and automotive industries. Individual part stress testing must be continued to remove potentially defective devices. Reliability test requirements should be standardized to the greatest extent possible, for straightforward comparative analysis and minimum test cost. Automotive product organizations must gather the expertise to provide interactive involvement in failure mode identification, testing, and environmental effects analysis.

by Robert L. Luce
National Semiconductor Corp.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p31-2
Rept. No. SAE-790241 ; 1979 ; 6refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 471

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION

Custom CMOS (complementary metal oxide semiconductor) approaches to most measurement and warning signal needs of the automobile are discussed. Included are considerations for selection of a technology, possible circuit approaches for system design needs, characteristics of the technologies, and variations to be expected with environmental changes. Device and building block characteristics of the technologies are considered, along with their variations. Environmental protection such as input protection techniques for electrical transients and temperature excursion are discussed. Original design custom circuits are described for monitoring nine functions in a car (high/low voltage, engine hot, low coolant, headlights on, seat belt, low fuel, key minder, door ajar, bulb check), and a bi-torque tachometer driver. Diagrams of the circuits accompany the text.

by C. A. Stascausky; E. C. MacDonald
Stewart Warner Electronics
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p33-44
Rept. No. SAE-790338 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 472

FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY

The new 1979 Ford speed control system features a custom hybrid (analog and digital) LSI (large-scale integration) circuit, fabricated using I2L technology, in place of the all discrete component electronics formerly used, and incorporating a "resume" feature not previously offered. The system, which is offered for the first time for manual transmissions, was independently designed by multiple vendors from functional block diagrams, which included definition of all external components and characterization of all inputs and outputs. The new system is a smaller, lighter, and potentially more reliable control module than its predecessor. Manufacturability has been enhanced by the reduction in parts count and assembly procedures due to the integration of processing and memory functions into the integrated circuit.

by L. N. Benoit; S. A. Leszczynski; R. R. Pilkington
Ford Motor Co., Vehicle Controls Engineering, Dearborn, Mich.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p45-8
Rept. No. SAE-790339 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 473

APPLICATION OF ELECTRONIC SYSTEMS AT FORD

Ford Motor Co.'s activities are reviewed in the application of electronic systems both in the vehicle and in manufacturing. Some advanced concepts for automotive controls are discussed, including an explanation of how the speed and power of the chip computer are utilized for real-time integrated controls and how loops are closed for adaptive controls. The question of the ability of the service industry to handle these new controls is addressed, with emphasis on the computer's ability to diagnose its own control systems. The rapidly spreading use of microprocessors in automotive manufacturing plants is described, and resulting opportunities in mass production functional control indicated.

by H. C. MacDonald
Ford Motor Co., Engineering and Res. Staff, Dearborn, Mich.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p49-52
Rept. No. SAE-790341 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 474

A SINGLE CHIP MICROCOMPUTER WITH SYSTEM FEATURES

A new microcomputer family, the S2000, has been designed to minimize system parts count by integrating system requirements "on chip", and has been specialized for various system requirements. The family approach allows the system features to be enhanced when desired by moving up the line while maintaining compatibility in software and general familiarity from the system designer's point of view. The family characteristics go from the low end S2000 (1K byte ROM (read only memory) and 64 nibble RAM (random access memory) to the S2400A with 4K byte of ROM, 128 nibbles of RAM, D/A (digital/analog) and A/D converter, high voltage outputs, etc. For special applications, the S2200C is identical to the S2200 except designed in CMOS (complementary metal oxide semiconductor) for low-power applications. The S2000 family is designed with a system solution in mind. Special instructions allow single byte manipulation of typical automobile control problems. Appended is a S2000/2150 and S2200/2400 instruction set summary of program control instructions.

by Richard A. Nedbal
American Microsystems, Inc.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p53-61
Rept. No. SAE-790342 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 475

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS

The application of single-chip microcomputers to automotive control systems is discussed, particularly in terms of cooperative planning by the designer, the manufacturer, and the user. The advantages of a microcomputer are discussed (e.g. small size, customized logic functions, low cost, high-volume standard products), emphasizing that success in application requires careful and involved management decisions. Selection of a microcomputer by the automotive system management is discussed, the most important factor being the careful definition of the function of the end product. The need for a close association between hardware and software design is discussed. The single-chip microcomputer is discussed in terms of tolerance in the automotive environment. Testing of the microcomputer via an incoming inspection of the components and a functional test of the unit operating in the end system is described. There needs to be a close relationship between customer and supplier in terms of milestones in the manufacturing and delivery cycle so that delivery and projected need can be coordinated; a cycle typical of the industry is described. A glossary of "buzz" words used to describe single-chip microcomputers is included.

by Dean A. Bennett
Fairchild Camera and Instrument Semiconductor Div.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p63-9
Rept. No. SAE-790343 ; 1979
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 476

MICROCOMPUTER--SIMPLIFYING SOPHISTICATION

Following a general description of the manufacture of microprocessors, including quality control points, testing criteria, and cycle times, the Mostek MK3870 family of microcomputers is discussed to illustrate the sophistication of state-of-the-art MOS/LSI (metal oxide semiconductor/large-scale integration) and automotive applications of this technology. The devices in the 3870 family are complete 8-bit microprocessor systems on a single MOS integrated circuit. All family members execute the F8 instruction set of more than 70 commands. ION-implanted N-channel silicon-gate MOS with advanced circuit design gives the MK3870 the excellent reproducability, reliability, and low component cost vital to a wide range of control and logic applications. The concept of In-Socket Expandability provides the designer with the ability to enhance or expand a system into which the 3870 is designed merely by replacing the 3870 with another member of the family (2876, 3872, 3873). The 3870 can be applied in engine control, keyboard displays, and serial link distributed processing networks.

by Don Folkes
Mostek Corp.
Publ: HS-026 462 (SAE-SP-440), "Automotive Electronic Systems," Warrendale, Pa., 1979 p71-7
Rept. No. SAE-790499 ; 1979 ; 3refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: In HS-026 462

HS-026 477

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT

The specialized training of personnel to teach traffic safety and the establishment and maintenance of a social system for that purpose in Japan are proposed. It is felt that the present education and training of traffic safety instructors are qualitatively and quantitatively inadequate. The establishment of a "Traffic University" is proposed which would offer an education comparable with that of a regular university. This university would train personnel to provide traffic safety guidance to youth from kindergarten through high school and up to the university level, as well as to the public in general. The institution would also provide training in driver education, as well as in traffic-related professions (e.g. traffic control officers (police department), automobile insurance investigators). Problems of traffic safety education in the present school curriculum are addressed, and a tentative scheme is presented for the "Traffic University", including curricula. The problem of "bosozoku", or hot rodder gangs is mentioned, as well as of high school motorcycle riders. Interim measures are proposed, including lecture meetings to prepare for national examinations, correspondence courses, and establishment of a preparatory institute, such as the International Assoc. of Traffic and Safety Sciences.

by Mitsuo Nagamachi; Toshisada Nagaoka
Publ: IATSS Research v3 p3-13 (1979)
1979 ; refs
Sponsored by International Assoc. of Traffic and Safety Sciences.
Availability: See publication

HS-026 478

SYMPOSIUM "THE TRAFFIC DILEMMA." PROJECT REPORT

Key points made in panel discussions and subsequent open discussions at a symposium on "The Traffic Dilemma" are presented, as well as an overview of the subject. Aspects covered in the session on the psychological analysis of traffic included the pleasure of speed, the Japanese enthusiasm about mechanical things, separation and integration of people and vehicles, integration of vehicles and space, and problems involved in utilizing foreign-origin public transportation systems. In the second session, the concept of sociological dysfunction (unforeseen consequences of a more closely integrated society) in the development of transportation systems was addressed. The final session discussed the traffic dilemma in terms of the overuse of transportation, the loss of independence by service companies due to public control and support, overuse of space, conflicts due to transportation links between large and small areas, and expansion and improvement of roads resulting in increased traffic volume. Cultural and psychological differences were stressed in connection with all phases of the transportation problem.

by Takashi Morita
Publ: IATSS Research v3 p14-21 (1979)
1979
Symposium held in Tokyo, 24 Sep 1977. Sponsored by International Assoc. of Traffic and Safety Sciences.
Availability: See publication

HS-026 479

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT

The background and organization of the International Assoc. of Traffic and Safety Sciences Symposium on Traffic Science are described, and summaries are presented of the papers delivered in each of five sessions. The theme of the international symposium was "Mobility for Man and Society". It was realized that various transportation problems today cannot be resolved unless the concept of mobility is analyzed from a broad perspective including cultural and historical considerations. The five sessions were: Why Mobility?, Mobility and Human Behavior, Mobility Needs in the Society, Mobility Planning, and Mobility for a Better Environment. A round-table discussion concluded the symposium. A copy of the agenda is included.

by Hiroshi Miyakawa
Publ: IATSS Research v3 p22-40 (1979)
1979
Symposium held in Tokyo, 20-22 Sep 1978.
Availability: See publication

HS-026 480

FASHION AND TRANSPORTATION

The social psychology of human mobility is examined with reference to the automobile. The significance of the interaction of the concept of "fashion" and of human mobility in modern culture is discussed. A new approach to cultural studies is seen necessary, described as that of "mobile humanity". Communications, transportation, fashion, and "mobility space" are discussed as they apply to this approach. Fundamental trends in fashion (popular music, "outdoor-oriented culture") are examined as they relate to mobility space and the use of cars. Some insights are presented on the impact of industrialization and consequent social mobility on the traditional Japanese view of social strata as the most important basis in human association, as well as the impact of communications media and of rapid transportation.

by Hideaki Hirano
Publ: IATSS Research v3 p41-7 (1979)
1979 ; 9refs
Availability: See publication

HS-026 481

GENERAL EVALUATION OF TRAFFIC ACCIDENT COUNTERMEASURES

In the 1970's, there has been a continuing decrease in the number of traffic accidents in Japan. The 718,080 accidents recorded for 1970 were down to 471,041 in 1976; the number of fatalities was reduced from 16,765 to 9,734. This decrease is encouraging from the perspective of an international comparison and for the long-term trend. Traffic accident figures for other countries indicate that the decrease will soon level off. On the whole, Japan's traffic safety countermeasure policies (Fundamental Law of Traffic Safety Countermeasures of 1970, First Traffic Safety Fundamental Plan of 1971-1975, Second Plan of 1976-1980) have heretofore met with quite a degree of success. Problems that remain include inadequate provision for "traffic orphans" (one or both parents lost in a traffic accident), inadequate ambulance and emergency services, and inappropriate pedestrian crosswalks and bridges. On a scale of 100, Japan's traffic accident countermeasure program ranks 70. For the future, it is essential to systematically rank traffic safety priorities, and to collect accurate traffic safety data. Countermeasure program evaluation methods are discussed, including comparisons of purpose, standards and results, comparison with other areas, cost and effect, and analysis of the contributions of individual countermeasures.

by Ryohei Kakumoto
Publ: IATSS Research v3 p57-70 (1979)
1979 ; refs
Availability: See publication

HS-026 482

BASIC RESEARCH ON REAR-END COLLISIONS

Statistical data on traffic accidents which occurred on streets and highways throughout Osaka prefecture (Japan) from 1973 to 1975 and on the Hanshin Expressway (Osaka) from 1972 to 1976 have been analyzed in terms of rear-end collisions. Rear-end collisions on the roads in general were the second most frequent type of accident, exceeded only by vehicle-pedestrian accidents, and accounted for 1/4 of the accident total. More rear-end accidents occurred on trunk roads such as national highways, with increased occurrences at intersections. On the Hanshin Expressway, two-vehicle crashes accounted for 60% of the total accidents, with 78% of them being of the rear-end type. On the roads in general, the annual rear-end accident rate was found to be 55/100 million vehicle km; for the Hanshin Expressway, it was found to be 14/100 million vehicle km. A direct relationship was found between number of rear-end accidents and traffic volume. No clear relationship was found between number of rear-end accidents and road geometry. Countermeasures are outlined from the standpoint of human factors, traffic management, traffic safety facilities, and road engineering.

by Takashi Nishimura; Hiroyuki Takai
Publ: IATSS Research v3 p94-107 (1979)
1979
Sponsored by International Assoc. of Traffic and Safety Sciences.
Availability: See publication

HS-026 483

WHAT YOU SHOULD KNOW ABOUT AUXILIARY TANKS [RECREATIONAL VEHICLES]

Information is presented for the recreational vehicle owner on the selection and installation of auxiliary gasoline tanks. Auxiliary fuel tanks, their typical locations and gasoline safety cans are illustrated, and a list of tank manufacturers is provided. Some pointers are provided on tank quality as there are few regulations governing production and use. Any tank should be sturdy (heavy gauge metal), with internal baffles for restraining liquid movement in the tank. Reputable fuel tank manufacturers will readily supply all the details about their products, will demonstrate installation fittings, and will explain their testing procedures. Tank warranties are important. Reputable manufacturers conduct crash tests to verify that a tank designed for a specific location on a specific make, model, and year vehicle will withstand various crash conditions. Reputable firms do not mount a tank in a vehicle they have not tested, nor in an innovative location. The major criteria in mounting positions are protection, support, and anchoring (preferably to the frame). Compartment locations should obviously be vented and thoroughly isolated from the coach interior. Fuel emission standards specify that fumes from a fuel tank must not enter the atmosphere. Tanks must be designed so that they can not be filled to capacity and so that they have a vent through which fumes are carried through a filter into the carburetor. Tanks which contain unleaded fuel must also have a fill neck too small for a leaded gas pump nozzle. Safety considerations for using a spare gasoline can rather than a spare tank include use of a safety container (i.e. cannisters made with a special spring closure, a device for preventing sparks from igniting vapor, a vapor vent, a pouring spout, and an approved label), locating the can in a garage or shed well removed from heat or ignition sources, and storing only small quantities of gasoline.

by John Thompson
Publ: Trailer Life v39 n8 p36-8, 40, 45, 47 (Aug 1979)
1979
Availability: See publication

HS-026 484

ALCOHOL FUEL: THE GREAT CLEAR HOPE

The potential for alcohol fuels (methanol and ethanol, pure or as gasohol) in the U.S. is explored. Background information is given on these fuels in terms of source, production, current use, potential applications, and growing support for their use. The source, economics, commercialization, and safety and environmental implications of alcohol fuels as an alternative energy source are separately discussed. Places to contact or visit and publications to read regarding alcohol fuels, energy policies, technology, or do-it-yourself production (including special loans) are listed. Further discussion of gasohol is included in a separate article, "Washington Dateline," by Wayne Kennedy.

by Alan Tratner
Publ: Trailer Life v39 n8 p54-6, 58-9, 62-4, 69-70 (Aug 1979)
1979 ; refs
Availability: See publication

HS-026 485

THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]

About 60% of automobile/motorcycle accidents are considered to be the fault of the car driver, the main cause being the driver's inability to see the motorcyclist (even in daylight hours). Motorcycles are difficult to see because of their relative smallness. Some of the blame for these accidents also lies with cyclists' faulty riding habits, such as riding to the far left or right of the lane, out of the scope of a rearview mirror and in the blind spot of the car in front. If a motorcyclist uses the center of the lane, oil and grease reduce his traction by as much as 60%, too high a price to pay for increased visibility. Riding at the edge of the lane makes the motorcycle difficlt to see for a car pulling out of an alley or a parking lot. Unsigned and unsignaled intersections create another situation of reduced visibility, especially where trees may hide the motorcycle from view. Dangerous antics by motorcyclists (e.g. riding down the center line between lanes of traffic, dodging slower-moving cars) are also a threat to all motorists. Recent legislation by most states requires motorcycle headlights and taillights to be on when the cycle is in operation, and some states require front and rear turn signals. Many motorcycle manufacturers are now installing large reflectors on the sides of motorcycles. Clothing and helmets are being designed in bright colors, often with strips of reflectorized tape. Motorcycle safety classes are offered by most motorcycle shops and by many police departments.

by Deborah S. Romaine
Publ: California Highway Patrolman v43 n4 p11, 62 (Jun 1979)
1979 ; 1ref
Availability: See publication

HS-026 486

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]

Tips are provided for the motorist on how to react when an emergency vehicle is approaching. Comments by a California Highway Patrolman and a fireman from the Novato Fire Protection District (Calif.) are included. When a driver hears a siren from behind, he should look around before pulling over to the far right side of the road (as prescribed in the driver's manual). If a patrol car appears to a motorist's right, the motorist should slow down and remain where he is. If there is an open space on the motorist's left, the patrol car is directly behind, and the motorist cannot go to the right, the motorist should go straight ahead so that the emergency vehicle can move into the open space. The rule of moving to the far right applies whenever possible. If a patrol car is merely flashing the red light, a motorist need only stay out of the way. An approaching ambulance or fire engine with siren and flashing light, will move in response to the motorist's movements. Once a motorist has started to make a move, he should follow through. If a driver cannot locate the source of the sound of a siren, he should pull over to the right until a determination can be made. The patrolman and the fireman feel that motorists in general are cooperative and quick to comply in emergency situations.

by Shan Finney
Publ: California Highway Patrolman v43 n4 p16, 72-3 (Jun 1979)
1979 ; 1ref
Availability: See publication

HS-026 487

LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC

Since the Truck Permit Office in Louisiana's Dept. of Transportation and Development began operations on 29 Jun 1977, it has been much easier and more convenient for truckers to obtain permits for overweight and oversized loads. The new operation has centralized issuance responsibility, that had previously rested with 11 different state police troops, in one office in Baton Rouge, allowing for more standardized procedures and improved availability of permits. Permits can now be obtained by any one of five methods: in person, by application through the mail, by charge account, by a prepaid permit system, or through the wire services. The main advantage of having a charge account is that it only takes 3 min. to activate a permit by telephone. The Truck Permit Office operates 14 hr/day during the week, and 7 hr on Saturday. All clerks are required to have a working knowledge of Louisiana weight laws to facilitate rapid processing of permit requests. Since clerks do not actually see or inspect a vehicle when they issue a permit, the information on the permit is checked against the vehicle and load by weight enforcement officers in the field. Vehicles with gross axle weights exceeding 212,000 lb may be subject to special restrictions, and applications must be submitted well in advance of the intended trip; loads in this category are granted permits only if there are no other means of movement than a public highway. The entire operating cost of both the Weight Enforcement Office and the Truck Permit Office is covered by truck permit fees. For FY 1978-1979, the Truck Permit Office will collect an estimated average of $420,000/mo.

Publ: Transportation Research News v82 p8-10 (May-Jun 1979)
1979
Availability: See publication

HS-026 488

AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM

Most available evidence implies that the random motor vehicle inspection, as conducted by the Ohio Highway Patrol, has little potential for reducing the number of traffic accidents, compared to other safety measures. Vehicle defects are estimated to cause only 6% of all traffic accidents nationally; the Patrol estimates less than 3% of Ohio accidents are caused by such defects. Random inspection has no "inspection effect," if fewer than 20% of the vehicle population is inspected; the Patrol annually inspects around 10% of the registered vehicles in Ohio. Although no direct relation between inspection programs and accident rates has been established, states with periodic inspection generally have lower fatality rates. The Dept. of Transportation's list of 37 traffic safety measures does not include random inspection. Since roadside inspection is less effective than garage-based inspection in checking critical components (e.g. brakes, wheels, tires), the usefulness of the Patrol inspection procedure is questionable. The present Ohio program includes inadequate follow-up, and does not concentrate on high-risk older vehicles. Costs of Ohio's program are exceeding benefits. Because of inspection site locations, Ohio's program is not random. To improve the program, it is recommended that: the Highway Patrol locate inspection sites in urban areas, selectively inspecting older vehicles; increase inspection hours and follow-up; and improve inspection quality. Alternatively, it is recommended that the General Assembly eliminate the motor vehicle inspection program, implement a periodic inspection program, reallocate program funds to other highway safety measures, or support a greater or lesser number of inspection teams as funding permits.

Ohio Legislative Service Commission, State House, Columbus, Ohio
Rept. No. PB-284 101; Info-Bull-1977-1 ; 1977 ; 67p 44refs
Availability: NTIS

HS-026 489

ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN

The goals and methodology are described for the conduct and assessment of the Concentrated Traffic Enforcement Program that will be carried out by the Illinois State Police beginning 1 Sep 1977. Appended are district-wide objectives, illustrations of police routes, accident data for high-accident locations, and Illinois State Police operations instructions. Efforts will be directed at reducing vehicular accidents and their resultant injuries and deaths through increased police enforcement of all traffic laws at 45 state-wide high-accident locations. The six-month program (Sep-Dec 1977, May-Jun 1978) will utilize 49,280 man-hours, which will be devoted to patrol during critical days of the week and times of the day as suggested by accident patterns. This includes, but is not limited to, the two most dangerous periods: from 6 PM to 6 AM on Friday and Saturday nights. Additionally, public information campaigns will be conducted and judicial contacts made and maintained. The program's effectiveness will be measured by changes in accident frequency and severity.

Illinois Dept. of Transportation, Div. of Trafic Safety, Springfield, Ill.; Illinois State Police, Field Operations Office
Rept. No. PB-283 926 ; 1977 ; 123p 2refs
Availability: NTIS

HS-026 490

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM

The Federal Aviation Administration is developing a computer modeling program (SOMLA--Seat Occupant Model: Light Aircraft) in an attempt to provide a practical engineering and design analysis tool for aircraft seat designers. To validate the model, two series of well-instrumented, controlled tests have been completed. Two basic seat configurations, two different impact vector orientations (forward-facing, and combined forward and downward), and two different impact levels were utilized to produce both elastic and plastic seat deformations. Measurements of seat reaction loads, seat belt loads, and dummy accelerations were made, and the tests were documented by high-speed motion picture film. Each test condition was repeated to obtain a statistical measure of test variability. The model, test program, and test results are discussed, as well as their implications for model development. The test data are appended. It is concluded that the response of the dummy used in the dynamic testing has been simulated rather accurately, particularly with respect to chest acceleration and belt loads. Attempts to simulate the response of the test seats have indicated that the present method of treating plastic deformation, by modification of elastic stiffness matrices, may not be suitable for analysis of seat frames that undergo large deformations. For frames that consist of elements whose stiffness are of the same order of magnitude, the model behaves well until a sufficient number of plastic hinges have been released to permit collapse of the structure in a rigid-body type of motion.

by R. F. Chandler; D. H. Laananen
Federal Aviation Administration, Civil Aeromedical Inst., Okalhoma City, Okla.; Pennsylvania State Univ., University Park, Pa.
Rept. No. SAE-790590 ; 1979 ; 99p 26refs
Technical Paper Series. Presented at Business Aircraft Meeting and Exposition, Wichita, Kans., 3-6 Apr 1979.
Availability: SAE

HS-026 491

"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]

Rough sketches are presented and discussed which approximate lines of sight (inside and outside rearview mirrors and their overlap) and the blind spot on the left observed from improperly and properly adjusted car mirrors. It is stressed that the overlap area between the fields of vision of the two mirrors should be minimal or nonexistent to increase viewing efficiency. The procedure for properly adjusting the mirrors is explained: The inside mirror is positioned to show the view directly behind the car, back to infinity; the driver, in his regular driving position and without moving his head, selects an object seen at the extreme left of the inside mirror, adjusting the outside mirror so that its right edge just excludes the selected object. A check is made to see that no blind spot exists between the two mirrors. A road test of properly adjusted mirrors shows that as a car approaches to one's left, it will disappear from the inside mirror just as it appears in the outside mirror. The driver is cautioned to be aware of motorcycles, and of blind spots that still remain to the right and left when driving on a road with three or more lanes in one direction. It is also advisable not to adjust mirrors on hills or curves, or when the car is not parallel with the road.

by Kenneth L. Zuber
Publ: California Highway Patrolman v43 n4 p10, 55 (Jun 1979)
1979
Availability: See publication

HS-026 492

VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78

Vehicle mean speeds, traffic composition, and lane usage data were recorded on the M1 motorway in Nottinghamshire, England during Nov 1974-Dec 1975, Jan-Nov 1976, and Mar 1977-Nov 1978 under the same conditions (good weather, dry surface, off-peak, weekdays) as earlier measurements (1968-1969, 1969-1973). During Nov 1974-Dec 1975 immediately after oil crisis of Oct 1973-Oct 1974, mean speeds of passenger cars were about 2.5 mph below the immediate pre-crisis period (Oct 1972-Sep 1973), but speeds of goods vehicles (trucks) had fully recovered. Since 1975, mean speeds of cars appear to have increased by about 3 mph and those of medium and heavy trucks by about 1.5 to 2 mph. Up to Nov 1978, there was no sign that increasing fuel prices resulted in generally lower speeds. The percentage of cars on the road fell during and immediately following the 1973 crisis, but by 1978 had reached a new high level of 65.8%, reflecting continued increase in the level of car ownership since 1975. The continued increased of mean speed was also indicated by the increase in the percentage of cars using lane 3 (passing lane). It was also found that few drivers were deterred from using a section of the motorway being resurfaced, where the speed was restricted to 50 mph. Mean speeds of all vehicles over this section of the highway were reduced, those of cars up to 15 mph. Some 18% of cars exceeded the imposed 50 mph limit.

by L. W. Ackroyd; M. Bettison
Publ: Traffic Engineering and Control v20 n5 p254-5 (May 1979)
1979 ; 3refs
Availability: See publication

HS-026 493

SAFETY COMES FIRST WHEN TRANSPORTING THE HANDICAPPED

Based on a presentation by Dob Donley entitled "Impact and Implementation of PL 92-142 and PL 504," which has been delivered at various meetings attended by transportation supervisors, a discussion is provided of procedures and equipment for the safe transportation of handicapped children in school buses. As president of a supplier of lighting fixtures for the school bus industry, Donley has access to various transportation systems. His research in the practices being implemented in transporting the handicapped student includes visiting various schools and taking photographs of school bus drivers and aides at work, and of equipment being used in school buses. The result is a slide presentation representing good and bad procedures and equipment, presented here with photographs taken from his collection of slides. Topics include involvement of the transportation supervisor, the restraint of wheelchairs in buses, the physical layout of the school bus, vest or harness restraints, covering certain bus windows to prevent glare, unloading and loading procedures, and emergency evaluation.

Publ: School Bus Fleet v24 n3 p12-4, 16-7 (Jun-Jul 1979)
1979
Availability: See publicaton

HS-026 494

A BASIC GUIDE TO HANDICAP EQUIPMENT FOR USE ON SCHOOL BUSES

The construction, function, and desirable characteristics of three of the most widely used types of equipment for use by handicapped children on school buses (restraining vest, wheelchair restraint, and wheelchair lift) are described. Lists are provided of the addresses of manufacturers of the three devices; individual models of restraining vests and wheelchair restraints are described and illustrated in photographs.

Publ: School Bus Fleet v24 n3 p20-1 (Jun-Jul 1979)
1979
Availability: See publication

HS-026 495

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]

Information and helpful suggestions for drivers and supervisors in handling the transportation of the handicapped child are provided from the State of California School Bus Driver Training Course, Exceptional Child Unit, and from the Los Angeles Unified School District Handbook for Special Education School Bus Drivers. The various types of handicaps are described: educable mentally retarded, trainable mentally retarded, educationally handicapped, hearing handicapped, sight impaired, speech impaired, and orthopedically handicapped. The handling of behavior problems is discussed, emphasizing the need to recognize abnormal behavior and the role of medication in behavior changes. Loading and unloading processes are discussed, stressing the need for care and protection, the need to become familiar with all types of equipment used and worn by the children, and to know the extent of a student's limitations. The special characteristics of a special education bus driver are described: extra patience, alertness, emotional stability, personal warmth, understanding, etc. The crucial importance of cooperation between parents and driver/school is emphasized. Pertinent information about each child that should be provided to each driver is specified: name, address, sex, age, telephone number, type of handicap, picture of child, what to do if the parents are not at home when the child is returned from school; procedure to follow if the bus cannot reach the child's home; procedures if the child needs medical attention on the bus.

Publ: School Bus Fleet v24 n3 p34, 36, 38 (Jun-Jul 1979)
1979
Availability: See publication

HS-026 496

USED CARS

The various aspects of shopping in the used-car market are discussed in separate sections (individually authored) in this comprehensive guide for the prospective used-car buyer. The potential rewards in terms of price, choice, and availability are initially considered. A discussion of avenues for used-car shopping covers the use of the Sunday newspaper, weekly advertising "shoppers", and bulletin boards; communication of needs to friends and co-workers; the differences between dealer and private party sales; and the seasonal effect on car price. A checklist is provided of 50 steps in assessing the overall condition of the used car under consideration. Both major and minor points, requiring different degrees of effort and mechanical skill, are covered, including walkaround, underhood, cockpit, under carriage, and test drive checks. Advice is given to aid the consumer in determining the type of vehicle to look for, including the important factors of mileage and age, the type of use the car will get, the intended length of ownership, maintenance costs (especially price of replacement parts), and pricing guides used by dealers. Warranties are discussed in terms of types (original and used-car), components covered, length of coverage, obtaining information on a catalytic converter, extended policies, getting the warranty in writing and examining its specifics, and "as is" vehicles; some guidelines for purchasing a warranted used car are outlined. Factors to consider in determining whether to purchase a later-model used car as opposed to refurbishing one's present, older vehicle are discussed. A final section discusses the option of buying a used car from a rental agency (information provided by Hertz). Advantages include lower price, longer loan period for mechanic's appraisal, age limit of vehicle, and limited warranty.

by Leon Mandel; Fred Stafford; Peter Frey; Chuck Nerpel
Publ: Motor Trend v31 n7 p73-84 (Jul 1979)
1979
Availability: See publication

HS-026 497

STAYING AHEAD WITH [BICYCLE] HELMETS

An increased interest in offering bicycle helmets by various U.S. manufacturers is reported; sales of some 200,000 units are estimated for 1979. While each helmet manufacturer tests its own product and compares it to the competition, there are presently no standards for measuring helmet effectiveness. A set of voluntary standards by the Snell Foundation (California) have never been officially adopted. Dr. George Snively, the Foundation's director, states that the objective of a helmet is impact protection, to prevent the transfer of impact energy to the brain. The helmet requires some type of strap to keep it on the head, but there is some disagreement among manufacturers as to the best approach. The real dilemma in bicycle helmet design is to balance safety against comfort (e.g. weight, fit, ventilation). Among helmet manufacturers queried, none saw any immediate change in consumer resistance to buying and wearing helmets, and all thought that bicycle manufacturers could do more to promote helmet safety. Bicycle helmets are largely made by hand, and tremendous strides are being made in helmet design and production; for the future, more specialized helmets (e.g. one designed for children), and designs with lighter weight and stronger materials can be expected. Attached are advertisements for two types of bicycle helmets (leather and plastic).

by Walt Jarvis
Publ: Bicycle Journal v33 n6 p22, 24, 26, 106-8 (Jun 1979)
1979
Availability: See publication

HS-026 498

MOPEDS: THE 200MPG ALTERNATIVE

Mopeds enjoy wide appeal among the young (about 20% of mopeds used primarily by persons 19 years of age and under), and are popular among senior citizens because of their price ($300 to $700), their fuel economy (average of 135 mpg), maneuverability, and effortlessness of operation. Mopeds are sensible for deliveries, for short trips to run errands, and for avoiding traffic jams. It is estimated that the moped could eventually replace 10% of all auto travel. Included in the practical advice in purchasing a moped is to buy a model with front and rear suspensions, and always to carry a spare spark plug when traveling by moped. All mopeds in the U.S. must have headlights, taillights, and an audible horn. Most mopeds have two-stroke engines that require between 1.5% and 4% oil mixed with regular gasoline. Some 50 companies (mostly European) distribute mopeds in the U.S.; a wide choice of optional equipment is available for the prospective buyer. Mopeds are easy for the amateur to repair; maintenance is relatively simple and infrequent; and parts are generally inexpensive and interchangeable from brand to brand. In most states, mopeds are legal on all streets except interstate highways; the minimum age for operating a moped is usually 15 or 16 years.

by Kathy Hamilton
Publ: Autoweek v29 n26 p7 (9 Jul 1979)
1979
Availability: See publication

HS-026 499

THE DAMAGED WHEEL SHOULD BE REPLACED

A recent field survey by a wheel manufacturer in three major tire markets revealed that one wheel in 70 upon which the tire dealer had mounted a new tire was sufficiently damaged to warrant immediate replacement. The survey also showed that the tire dealer was generally unaware of the scope of the problem and the conditions that require wheel replacement. Some common wheel damage conditions are described and illustrated to assist the tire service specialist in his own wheel inspection program. The causes, result, and corrective action for the following damage conditions are outlined and illustrated: bent rim flange, elongated bolt holes, excessive rust or corrosion, center or bolt-hole cracks, and splitting or cracking along wheel weld. Three steps to a successful wheel replacement program are provided: establish wheel inspection procedure, build customer awareness, and maintain a minimal wheel inventory.

Publ: NTDRA Dealer News v42 n12 p17-20 (25 Jun 1979)
1979
Availability: See publication

HS-026 500

DRUNK DRIVING COSTS, MORE THAN YOU MIGHT FIGURE

A true incident is related in which a regional executive for a state's alcoholism program was arrested for drunk driving. The executive made no attempt to hide his guilt, and was willing to take the consequences. He found that his attitude helped his employer to decide against suspending him from his job. Before his case came to trial, he signed up to attend classes in his own agency's Alcohol Highway Safety Program. When the case came to trial, the judge was willing to reduce the charge to impaired driving even though the breathalyzer test revealed a 0.15% blood alcohol level. The man kept his license and paid a fine. Shortly afterward, he received notification that his auto insurance had been cancelled. Subsequently, the one company that would insure him cost $791 yearly, vs. the previous rate of $385. These rates had to be carried for the next three years. The experience demonstrates that even the professionals who are aware of the influence of alcohol on driving behavior can become victims of the drug. A chart shows the additional insurance premium costs imposed on DWI offenders in various U.S. cities.

Publ: Bottom Line v2 n4 p21-3 (Winter 1978)
1978
Availability: See publication

HS-026 501

COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE

In the case of J.C.'S Rock Saloon vs. William G. Milliken, the Federal District Court in Detroit has ruled that there is a rational and proper basis for raising the legal drinking age to 21, and even to age 25 if lawmakers or voters want to go further in combating drunk driving problems. Judge Ralph B. Guy, Jr. disagreed with the plaintiffs' argument that the state had no power, under the provision of the 14th Amendment, to make the legal drinking age different from the age of majority (18). He stated that states have been allowed to give differential treatment to various classes of citizens, based on age, providing there was a "rational" reason. The key question before the court was whether the voter-approved constitutional amendment, Proposal D, which raised the drinking age to 21 was a "rational" act. Plaintiffs argued that the sole basis for raising the age was traffic safety, which they contended was not a rational basis since older drivers (age 21-24) have similar driving records to those of younger drivers (age 18-20) in terms of alcohol-related accidents. Although Judge Guy agreed that the proponents of raising the legal drinking age to 21 had reasons other than traffic safety for their move, he said that the traffic safety issue alone was sufficient to satisfy the "rationality" test. Judge Guy's ruling included a discussion of the research of Dr. Richard Douglass of the Univ. of Michigan's Hwy. Safety Res. Inst. which indicated that lowering the drinking age in Michigan from 21 to 18 in 1972 was solely responsible for increased fatal accidents among 18 to 20-year-old drivers. Based on this conclusion, Judge Guy ruled that raising the drinking age to 21 was indeed a "rational" act. Guy also refuted plaintiffs' claims concerning freedom of religion, the fundamental right to drink alcohol, the rights of liquor licensees, and parents' rights.

Publ: Bottom Line v2 n4 p24-7 (Winter 1978)
1978
Availability: See publication

HS-026 502

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]

An "in-mold" coating method for compression-molded SMC (sheet-molding compound) parts has been developed by General Motors in conjunction with General Tire and Rubber Co. This process solves the surface blemish problem of producing smooth large plastic panels by casting a thin coating of a two-part urethane-polyester resin onto the part before it is removed from the mold. The first production parts with the molded coating were the header panels for the 1979 Pontiac Phoenix. The removable roof panels of the 1979 Chevrolet Corvette were also made by the new process. A different approach being perfected by Ford involves both a new material and a modification of the conventional compression molding process. PPG Industries' polyester resin (RS-50340) and Owens-Corning's glass reinforcement (No. 951) are the principal components of the compound. The main process variation is a pressure-reduction step before the part is fully cured. The first planned production part for the new material/process is the one-piece hood of the 1980 Econoline van. Two contenders with SMC methods for Class A surface automobile panels are reinforced reaction injection molding of polyurethane and injection molding of thermoplastics.

by Donald R. Dreger
Publ: Machine Design v51 n14 p108-13 (21 Jun 1979)
1979
Availability: See publication

HS-026 503

WHERE DID ALL THE GASOLINE GO?

The recent gasoline availability problem is not due to low stocks but because major oil companies decided to reduce deliveries to their dealers during the peak-demand summer months, a total reduction in allocations of more than 6% of 1978's supply (added on to a 3% increased demand). For unleaded fuel, the shortage is real; refineries have not been producing enough unleaded to keep pace with demand. In early 1979, 26% of primary stocks of gasoline was unleaded, while projected consumption was 36%. The amount of oil lost because of the Iranian revolution was never more than 1% of average daily U.S. consumption. Gasoline is amply available in the U.S., and will remain so, at increased cost. The demand for petroleum, even at a modest 2.5% industrial growth, will outstrip production in from 15 to 30 years. The Iranian situation has underscored the U.S.'s vulnerability to supplies of oil from OPEC countries, and has hastened moves to decrease this dependence. Various options to reduce domestic consumption of gasoline include weekend service station closings, coupon rationing, and allowing the price of gasoline to rise. The practical effect of station closings is to force 97% of the nation's gasoline sales into 62% of normal station hours. A coupon rationing ("white market") program is a government subsidy for one segment of the population at the expense of another segment, and the cost of administering the program is an added tax on everyone. Although price rationing would affect most those who are underprivileged, it should be possible to subsidize such groups through the income tax system. It is estimated that deregulation, which was initiated on 1 Jun 1979, will add 2 million barrels a day to the nation's output of crude oil by 1985 (more than twice the amount previously imported from Iran). Although alternate energy sources and revolutionary new engines are being explored, most people will have to learn to get by on less energy (by use of public transit, less recreational use of car, change in the number and types of vehicles owned, etc.). The role for the government is to develop a program that will end U.S. reliance on Middle Eastern oil (e.g. increased domestic production, and expanded facilities for distributing Alaskan oil).

by John Tomerlin
Publ: Road and Track v30 n11 p107-8, 110 (Jul 1979)
1979
Availability: See publication

HS-026 504

CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY

Experts in every field of transportation were questioned about how Americans will travel in the years to come. The experts predict a gradual shift to airplanes for intercity travel, 82% of which is now done by auto. Buses and trains will prove more popular, especially for short journeys. These shifts from car use are the result of increasing fuel prices and the limited comfort of today's smaller cars, as well as of poorer road maintenance. Vacationers and others who make cross-country trips are also taking into consideration the rising costs of food and lodging. In crowded urban centers, people will continue to use cars, even if they do not want to, since mass transit systems in most areas are already having difficulty in accommodating rush hour demand; without a healthy boost in Federal spending, ridership is expected to grow only modestly. To relieve big-city traffic congestion, experts say, solutions include better traffic control systems, pedestrian malls, bike paths, car pooling, and special routes to speed bus travel. For the most part, bus systems, not subway networks, will be called on to handle commuters. New government regulations will make it easier for elderly and handicapped persons to use buses. Most experts agree that while there will be no massive shift to buses and subways in the next generation, the typical car of the future will differ in many respects from the one today. Automotive engineers and other authorities predict that cars will become smaller, lighter, and considerably more expensive. Most will have front-wheel drive, and more will burn diesel fuel or more exotic fuels (gasohol, methanol). More two-passenger urban cars, some of them powered by electricity, will be used for commuting to work and running errands. Experts say that tomorrow's family car is likely to resemble, at least dimensionally, recently introduced General Motors' compact cars. Additional improvements in fuel efficiency will be made, as well as in car safety and sophistication.

by Caroline Mayer; Fred Frailey; Kenneth Sheets
Publ: U.S. News and World Report v86 n26 p48-53 (2 Jul 1979)
1979
Availability: See publication

HS-026 505

AUTOMOTIVE FUELS--OUTLOOK FOR THE FUTURE

Current and future supplies of petroleum-based and alternative fuels suitable for use in passenger cars and light trucks are examined. Prime movers and powertrains compatible with various alternative fuels, and General Motors' experience with these systems, are reviewed. Estimated ultimate petroleum reserves are about 70 times current world petroleum consumption; U.S. reserves are about 20 times current domestic petroleum use. In the short term for the U.S., the adequacy of petroleum supplies will depend primarily on imports, and also on government policy. At an annual growth rate of 3%, U.S. coal reserves (100 times greater than petroleum reserves) could satisfy domestic energy demand for about 120 years. Oil shale ultimate reserves are about twice those of coal; they are widely distributed and present environmental problems in production. If used in light water reactors of current design, uranium reserves could supply the U.S. energy need for less than ten years at a 3% growth rate; if used in breeder reactors, the supply will last 118 years. Solar energy's ultimate utility is severly limited by its unsteady nature and low conversion efficiencies. Gasoline and diesel fuel produced from oil shale appear to be most nearly cost competitive with similar fuels produced from petroleum. Synthetic gasoline and diesel fuel are the most desirable from the standpoints of density, exhaust emissions, and ease of transition. Economic incentives do not presently exist for synthetic fuels production. With respect to GM's experience, gasoline and diesel-like fuels are most desirable for heat engines. Less refined fuels could be used in continuous or external combustion engines, but might be detrimental in terms of emissions. Of the remote combustion systems which might use primary energy sources, battery electric on-board storage has the best potential.

by Joseph B. Bidwell
General Motors Res. Labs., Executive Dept., Warren, Mich. 48090
Rept. No. GMR-2733 ; 1978 ; 58p 64refs
Availability: Corporate author

HS-026 506

FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA

Immediately following President Carter's brief "automotive summit" with top industry executives, Secretary of Transportation Brock Adams announced that the manufacturers had agreed to join with the government and scientific community in a cooperative, multimillion dollar research effort to help lay the technology base for the next generation of automobiles. The research goal would be to produce at affordable prices a conceptually different car within ten years that would reduce U.S. reliance on dwindling oil supplies. After the press conference, Adams discussed two research safety vehicles on display which had been built under the sponsorship of the Dept. of Transportation (DOT). At a subsequent DOT news briefing, Adams emphasized the need for a comprehensive research blueprint for advanced automotive technology and challenged the public to participate in upcoming regional hearing on the auto's future. The projected government/industry price tag of $50 to $100 million per year represents only 5% of the total cost to introduce a radically new vehicle, Adams admitted. Asked if the automakers could afford to pick up 95% of the ultimate tab for his "supercar", Adams warned that the automakers will have to spend money to stay in business. The research program is scheduled to begin in FY 1981. In addition to the public hearings, Adams said that DOT has set up a procedure to review the work of private inventors.

by Paula D. Hodges
Publ: Automotive Industries v159 n6 p23, 25, 27 (Jun 1979)
1979
At head of title: Auto News/Analysis
Availability: See publication

HS-026 507

FUN-FLAT TIRES DUE OUT THIS FALL

Dunlop's Denovo 2 run-flat tire, introduced in Europe in Apr 1979, evolved from a conventional tire and wheel system. The original Denovo used a two-piece wheel with lubricant dispensers; a second version used Polygel lubricant applied to the underside of the tread. The Polygel seals punctures and provides a residual warm air inflation. The current tire uses the Denloc bead lock system and a one-piece rim. Dunlop claims that the Denovo 2 functions well in a deflated state for 100 mi at 50 mph, or if severely damaged, as by a long gash in the sidewall, will function safety for 50 mi at 40 mph. In 1978, the National Hwy. Traffic Safety Administration approved the Denloc concept. Dunlop has discussed direct deal and licensing agreements with several U.S. tire manufacturers. Firestone, Goodyear, and the auto industry recommend a dashboard warning light to indicate the run-flat mode, since the handling difference between the run-flat and normal inflation modes is very slight. The auto industry predicts that economic and psychological roadblocks will limit the use of run-flat tires in the U.S. for many years. Goodyear and Firestone are now developing run-flat prototypes with a reinforced sidewall. Goodyear estimates that its Self Supporting Tire will save 18 lb to 22 lb vs. a conventional five-wheel system with jack assembly, while Firestone's Advanced Concept Tires offer a 5 lb to 10 lb savings. Run-flats must match improvements made in conventional radials' rolling resistance plus the weight and space savings offered by their own temporary spares. In 1979, General Motors offers a precursor to the run-flat, Uniroyal's puncture sealant tire, as an option, while Firestone is considering introduction of the puncture-sealing Concept XXI, primarily a replacement tire.

by Kathy Hamilton
Publ: Autoweek v29 n26 p12 (9 Jul 1979)
1979
Oversized page (approx. 10.5" x 14.5").
Availability: See publication

HS-026 508

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]

Selection and application of appropriate techniques for in-plant and field repair of defective aluminum heat exchangers are discussed, including three flux (brazing, reaction flux soldering, noncorrosive flux soldering) and three fluxless (adhesive bonding, Gas Tungsten Arc Welding, ultrasonic welding) methods. Necessary equipment and consumables are designated, and step-by-step procedures outlined and illustrated by photographs. Two tables list the recommended in-plant and field repair techniques for such heat exchangers as radiators, air-conditioner coils and manifolds, heater cores, and oil coolers. Techniques for preparation of the area to be repaired are described.

by R. W. Gunkel; W. C. Weltman
Aluminum Co. of America
Rept. No. SAE-790401 ; 1979 ; 11p 4refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 509

THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4

Seven papers on the relationship between engine oil viscosity and engine performance were presented at a fourth symposium on the subject. Topics of the individual papers include the effect of viscosity on oil supply to the engine at low temperatures and low shear; high-shear studies of the viscous properties of engine oils in the laboratory; application of the present level of technical understanding to results from engine studies; and the role of viscosity in engine fuel economy. A review is presented of a major 1977 colloquium on the viscometry of multigrade oils.

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-434; ASTM-STP-621-S3 ; 1978 ; 104p refs
Includes HS-026 510--HS-026 516. Sponsored by Society of Automotive Engineers, Inc., and American Society for Testing and Materials.
Availability: SAE

HS-026 510

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS

The "W" portion of multigrade engine oils was previously classified only in terms of its low-temperature startability using viscosity measurements at -18 degrees C in the Cold Cranking Simulator. Because of the low shear rates encountered at the suction side of oil pumps, the low-temperature pumpability of the oils in the engine was not being considered. These studies were undertaken to correlate the low-temperature pumpability of multigrade oils in a full-scale engine with suitable viscosity measuremens with results of tests in laboratory pumping rigs. Comparative measurements of viscosities were obtained with different viscometers. A critical shear rate of 50 reciprocal seconds was found for the borderline pumping conditions of the test engine. Good correlations were found between viscosity data of a rotational viscometer and engine pumping data. With a special laboratory pumping rig developed for this project, very good correlations were obtained with the low-temperature pumpability of the engine. The temperature where borderline pumping occurs can be predicted equally well by the mean flow rates at the beginning of pumping or by the time when the first oil reaches the end of a capillary.

by W. Wiemann; W. J. Bartz
Institut fur Erdolforshung, Germany; Technische Akademie Esslingen, Ostfildern, Germany
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p1-9
Rept. No. SAE-780977 ; 1978 ; 14refs
Presented at International Fuel and Lubricants Meeting, Toronto, 13-16 Nov 1978. Research sponsored by Deutsche Gesellschaft fur Mineral-olwissenschaft und Kohlechemie e.v.
Availability: In HS-026 509

HS-026 511

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM

An international colloquium, held in Ostfildern, Germany on 7-9 Dec 1977, was attended by more than 250 persons from 18 countries. Speakers from 11 countries presented 24 papers. The program provided a comprehensive review of the state of the art of multigrade engine oils. In addition to discussions of the requirements of engines for specific oils and the fundamentals of rheology, the following main subjects were addressed: viscosity classification of engine oils development in the U.S. and in Europe; chemical and physical properties of viscosity index (VI) improvers; cold flow behavior and high-temperature viscosity of oils containing VI improvers; influence of mechanical, thermal, and oxidative stresses; engine performance of multigrade engine oils; and startability and pumpability of engine oils. Some of the most important results and conclusions concerning the relationship of engine oil viscosity to engine performance are reported and discussed; it has been shown that "effective viscosity" factors, such as temperature, shear rate, and pressure, are the keys for understanding the behavior of engine oils. It is concluded that possibilities for improving or extending the current viscosity classification system should be developed from the joint viewpoints of engine need, engine oil properties, and the tests required to correlate these parameters. The new classification system should include parameters such as pumpability properties at low temperatures, higher upper reference temperature, and shear rate effects on viscosity at high temperatures.

by Wilfried J. Bartz
Technische Akademie Esslingen, Ostfildern, Germany
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p11-32
Rept. No. SAE-780979 ; 1978 ; 21refs
Presented at International Fuels and Lubricants Meeting, Toronto, 13-16 Nov 1978.
Availability: In HS-026 509

HS-026 512

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY

Following a description of test procedure and experimental oils, the temperatures recorded in the big-end bearing of a running engine are discussed in terms of viscous heating, effective viscosity, and high shear rate (HSR) viscosity as measured in a rotary viscometer. Results concerning the minimum effective viscosity for safe operation are compared with available published results. Results for big-end bearings seem to correlate with results for main bearings which are much easier to evaluate. Under hydrodynamic conditions, it is possible to derive an effective viscosity from temperature rise determination. A uniform shear rate cannot describe bearing operation over the entire range of oil viscosities. The HSR viscosity at 6 x 10 to the fifth power reciprocal seconds adequately describes the bearing operation only between 6 mPa.s and 12 mPa.s. Under 6 mPa.s, the effective viscosity is overestimated by present HSR measurements, mainly due to an increase of the bearing shear ate caused by lower film thickness. The viscosity limit for afest operation of a bearing depends on the bearing surface ondition, operating conditions, and additive package. With a worn bearing, failure can occur even with an SAE 50 oil. Comparison of present and previous research suggests that for current viscosity index values, bearing problems may occur for some SAE 20 oils, as defined by their HSR viscosity or, even better, by their effective viscosity.

by J. Du Parquet; A. Godet
TOTAL, Centre de Recherches, France
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p33-45
Rept. No. SAE-780980 ; 1978 ; 11refs
Presented at International Fuels and Lubricants Meeting, Toronto, 13-16 Nov 1978.
Availability: In HS-026 509

HS-026 513

A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE

A simple rotary viscometer was constructed in which multigrade oils can be tested up to 150 degrees C and at shear rates of up to 4 x 10 to the fifth power reciprocal seconds. The apparatus has indicated the relative performance of oils, which differed in viscosity index improver but not in dispersant/detergent and antiwear additive treatment, in journal bearing wear and high-temperature cylinder bore wear tests. It demonstrably has not predicted differences in cylinder bore wear between lubricants, where these were due to the equally important differences in the reactivities of chemically-active additives. A viscosity classification test which can examine oils in a similar manner to this rotary viscometer could be a useful supplement to the existing classification test methods in indicating the rheologically-controlled behavior of multigrade oils in certain engine areas, although other nonrheological properties in the oil may be of over-riding importance. Lower shear viscosity data may prove to be more relevant to blow-by and oil consumption. It would be unwise to specify any single "safe" minimum viscosity value based on such a test, since engine conditions vary widely.

by W. C. Pike; F. R. Banks; S. Kulik
British Petroleum Co., Ltd., BP Res. Centre, Middlesex, England
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p47-55
Rept. No. SAE-780981 ; 1978 ; 5refs
Presented at International Fuels and Lubricants Meetings, Toronto, 13-16 Nov 1978.
Availability: In HS-026 509

HS-026 514

VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS

Four multigrade engine oils, containing the same base oil plus SE additive package but viscosity index improvers of differing shear stability, were evaluated in 80,000 km of high-speed, high-temperature vehicle service. Bearing, piston ring, and valve guide wear, as well as oil consumption, oil filter plugging, and engine cleanliness were all worse for the engines operated on the low shear stability oils. The wear differences were traced to differences in high shear rate (HSR) viscosity, while the cleanliness, filter plugging, and oil consumption differences occurred because of excessive wear or polymer shear degradation. For the V-6 engines studied, the critical viscosity needed to prevent excessive engine wear was estimated to be 4.5 cSt (measured at 149 degrees C and a shear rate of 6 x 10 to the fifth power reciprocal seconds); this is in reasonable agreement with other studies. The results suggest that engine oil viscosity should be specified under HSR conditions.

by M. L. McMillan; R. C. Rosenberg; C. K. Murphy
General Motors Corp.
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p57-74
Rept. No. SAE-780982 ; 1978 ; 28refs
Presented at International Fuels and Lubricants Meeting, Toronto, 13-16 Nov 1978.
Availability: In HS-026 509

HS-026 515

AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS

The influences on fuel efficiency of viscosity differences and friction modification by colloid friction modifiers in motor oil were examined separately and in combination in a series of automobile track tests using Environmental Protection Agency test procedures. It was found that simply reducing the viscosity of multigrade engine oils did not produce consistent, statistically significant fuel economy benefits, but this was achieved by the incorporation of a colloid friction modifier. Although reduced viscosity multigrade oils did not show significant benefits over a commercial type SAE 10w-40 proposal S-1 oil, those same oils containing the friction modifier demonstrated significant fuel economy improvements over the commercial oil. The same improvement was found for a single grade (SAE 30) oil so modified. Fuel efficiency increases in the range of 5% to 10% are attributable to the friction modifier.

by Peter J. Ghirla; R. Kennedy Smith
Acheson Industries, Inc.
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p75-95
Rept. No. SAE-780984 ; 1978 ; 18refs
Presented at International Fuels and Lubricants Meeting, Toronto, 13-16 Nov 1978.
Availability: In HS-026 509

HS-026 516

A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG

Several polymer-containing oils were studied in a journal bearing rig under hydrodynamic lubrication conditions. For shear rates up to 2.5 x 10 to the fifth power reciprocal seconds and oil film thicknesses down to 2 micron, these oils showed the same behavior as polymer-free oils. In a second series of experiments, the bearing was provided with a suitable lining and experiments were conducted under boundary lubrication conditions. Bearing wear could be determined by weighing the bearing shells, and the results obtained showed that for Newtonian lubricants, wear increased markedly with decreasing viscosity. The influence of the performance package was demonstrated by two SAE 30 grades. A decrease in wear of about 60% was effected by a change of the performance package. For non-Newtonian lubricants, the wear level was lower than expected on the basis of high shear viscosity alone; an attempt to explain this behavior should take into account non-Newtonian effects and possibly the presence of films of absorbed material.

by N. Van Os; A. Bos; D. Van Namen; J. C. E. D. De Rooij
Koninklijke/Shell-Laboratorium, Amsterdam, Netherlands
Publ: HS-026 509 (SAE-SP-434; ASTM-STP-621-S3), "The Relationship Between Engine Oil Viscosity and Engine Performance--Pt. 4," Warrendale, Pa., 1978 p97-103
Rept. No. SAE-780985 ; 1978 ; 15refs
Presented at International Fuels and Lubricants Meeting, Toronto, 13-16 Nov 1978.
Availability: In HS-026 509

HS-026 517

ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES

Approaches taken by a number of U.S. locatities in providing transportation to handicapped or elderly citizens are described. Some of these systems are Federally-funded, while some have developed from local initiatives. Some represent modifications to conventional public transit services, while some are special-purpose systems. Background information is given on the Urban Mass Transportation's Service and Methods Demonstration Prog., the identification of transportation priorities by the Transportation Task Force of the Urban Consortium for Technology Initiatives, and characterization of the transportation-handicapped population and their needs. Transportation systems for the handicapped or elderly individual are described for the following areas: Portland, Oreg.; Los Angeles County, Calif.; San Antonio, Tex.; Kinston, N.C.; Spokane, Wash.; Denver, Colo.; Ann Arbor, Mich.; San Diego, Calif; San Mateo, Calif.; State of Missouri; St. Louis, Mo.; Atlanta, Ga.; Los Angeles, Calif.; Philadelphia, Pa.; Dade County, Fla.; Boston, Mass.; State of Pennsylvania; and Washington, D.C. Lists are provided of the names and addresses of persons contacted in this investigation of existing systems, and of the members of the Urban Consortium Transportation Task Force. Selected characteristics of special and regular services of the various systems are presented in charts.

Public Technology, Inc., 1140 Connecticut Ave., N.W., Washington, D.C. 20036
1979 ; 64p refs
Sponsored by Urban Mass Transportation Administration.
Availability: GPO

HS-026 518

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY

A recent study sponsored by the Federal Hwy. Administration is summarized. The study was undertaken to develop guidelines which would enable system planners to numerically estimate the need for a reduced visibility guidance (RVG) system, to select candidate systems tailored to plan requirements, and to estimate utilities and costs. The guidelines consist of a set of well-defined steps, as follows: quantify the need, define problem area characteristics, define major system elements, define adjunct system elements, make cost-utility comparisons, and select a system. Elements in each step are outlined in detail.

Federal Hwy. Administration, Implementation Div. (HDV-21), 400 7th St., S.W., Washington, D.C. 20590
1979 ; 24p 5refs
See also Final rept. "Study of the Effectiveness of Reduced Visibility Guidance Techniques," v1, HS-027 149 and v2, HS-027 099.
Availability: Corporate author

HS-026 519

IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS

Experimental measurements were made of ignition times and ignition frequencies under both convective and radiative heating on fabrics with and without a condensed phase active flame-retardant treatment. Minimum self-ignition temperatures and apparent molecular weight were also measured on pyrolyzate gases generated from two fabrics. It was found that the effect of flame-retardant treatment depends on heating intensity, fiber composition, heating mode, and level of treatment. Under some conditions the treatment effect reduces the hazard level; under others, the level is increased. Minimum self-ignition temperatures of the pyrolyzate-air mixtures generated from treated and untreated cellulosic fabrics were found to be dependent on the heating rate during the pyrolysis of the material. The temperatures decreased with increasing heating rates and with the flame-retardant treatment. Apparent molecular weights of the gases decreased with increasing heating rates during pyrolysis and with the flame-retardant treatment.

by P. Durbetaki; H. Chang; G. L. Matson; W. C. Tincher
NSF-GI-31882; NBS-G7-9003
Publ: Journal of Fire and Flammability v10 p105-28 (Apr 1979)
1979 ; 16refs
Availability: See publication

HS-026 520

IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS

Six samples of aircraft interior fabrics were evaluated for resistance to ignition by radiant heat. Five samples were aircraft seat upholstery fabrics and one sample was an aircraft curtain fabric. The seat fabrics were 100% wool (2 samples), 83% wool/17% nylon, 49% wool/51% polyvinyl chloride, and 100% rayon. The curtain fabric was 92% modacrylic/8% polyester. The seat fabric samples were additionally evaluated in terms of resistance to ignition by a smoldering cigarette. Resistance was compared to fabrics of 100% cotton and 100% polyolefin. The wool-containing seat fabrics appeared to be superior to the rayon seat fabric in resistance to both types of ignition. None of the fabrics tested was identified with U.S. Airlines.

by Carlos J. Hilado; Debra L. Brandt
NASA-NSG-2039
Publ: Journal of Fire and Flammability v9 p527-34 (Oct 1978)
1978 ; 5refs
Availability: See publication

HS-026 521

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]

Twenty-six service-related companies and trade associations were contacted for their views on how restrictions on gasoline use (voluntary or mandatory) might impact on the service business. Manufacturers of replacement parts did not believe that increasing the price of gas or asking car owners to reduce driving will lessen demand for service. Of 15 parts companies contacted, only three firms (Carter Carburetor, Sealed Power, and Holley Carburetor) indicated that they had considered any possible repercussions of the Administration's fuel-saving effort on the service business. Carter and Sealed Power did not appear to foresee any reduction in service volume, while Holley anticipates more cooperation on the part of companies to conserve fuel than on the part of individual car owners. Major trade associations (Automotive Service Councils, Motor and Equipment Manufacturers Assoc., Automotive Warehouse Distributors Assoc., Automotive Service Industry Assoc., Equipment and Tool Inst.) expressed similar views. One opinion was that, due to reduced disposable income, drivers will buy new cars less often, thereby requiring more service. Another opinion indicated that the need to increase fuel economy will lead to more frequent tune-ups and better maintenance of automobiles.

by Bob Lund
Publ: Motor v152 n1 p62-4 (Jul 1979)
1979
Availability: See publication

HS-026 522

FILTER SERVICE

Filtration of contaminants in the automobile of today is as vital a function as supplying fuel and lubrication. The sophistication of the systems under the hood and chassis demands at least an equally sophisticated filtration effectiveness. The function, types, source of contaminants, service intervals, and servicing problems for the following types of automotive filters are discussed for the service specialist: oil, air, fuel, automatic transmission, coolant, crankcase breather air, and vapor canister. The special problems of diesel fuel filtration are outlined, including that of bacterial contamination. A chart denotes severe service intervals for inspecting or replacing filters and changing the oil. Some tips on "selling" filters are given. It is emphasized that factory "normal service" recommendations may not be enough when driving practices require more frequent "severe" servicing.

Publ: Motor v152 n1 p38-40, 42, 44, 47 (Jul 1979)
1979
At head of title: Motor Clinic Series.
Availability: See publication

HS-026 523

NO MORE GAS TANKS??

Solar Reactor Corp. (Miami, Fla.) researchers have discovered that a recyclable combination of light, hydrogen, and chlorine can be adapted to reciprocating, turbine, and rocket engines, totally eliminating the need for fossil fuel. Because the process is self-contained and recyclable, there are no exhaust emissions. The process is a revolutionary concept in harnessing energy wherein hydrogen and chlorine gases are allowed to react with air. Energy from light expedites the rate of reaction to produce a powerful explosion when air is introduced. Proper confinement allows this energy to be harnessed in the form of useful work. The process and its applications to internal combustion engines and turbine engines are covered under several patents. Solar Reactor, plus other labs, have run thousands of tests, repeatedly verifying the process while refining its applicability as a significant source of power. The process is approximately 14 times more energetic than gasoline combustion. Since the combustion products can be converted back to the starting fuel, self-contained power units using recycled fuel can be developed. One gallon of gasoline costs $1.00 and provides about 100,000 Btu's, while one gallon of 30% solution of hydrochloric costs $1.00 and provides 500,000 Btu's. Because light-activated chlorine and hydrogen combine explosively at one atmosphere pressure, piston kinetic engines would not require a compression stroke, resulting in increased engine efficiency of up to 80%.

by John F. Judge
Publ: Government Executive v11 n7 p20-1 (Jul 1979)
1979 ; 1ref
Availability: See publication

HS-026 524

THE END OF THE FAMILY CAR?

Lightweight diesel engine manufacturers say that the technology shows no signs of being able to meet the NOX (nitrogen oxides) emission standard of 1.0 g/mi in the 1981 model year, and the industry is applying for waivers to the Environmental Protection Agency (EPA) to set a standard of 1.5 g/mi. EPA also has set particulate emission standards of 0.6 g/mi for 1981 and 0.2 g/mi for 1983; the latter figure cannot be met by diesel engine manufacturers. The problem is that the method for reducing NOX in diesels involves exhaust gas recirculation, which increases particulate emissions by factors of 2 to 3. General Motors has proposed that a Corporate Average Particulate Standard be imposed to control the average levels of particulate emissions from a manufacturer's total car and light-duty truck production, both diesel and gasoline. The GM proposal involves standards starting at 0.2 g/mi in 1981 down to 0.05 g/mi in 1985, with a maximum permissible particulate emission of 1 g/mi from any individual diesel vehicle. The crucial challenge to the diesel, however, is the charge that diesel exhausts are carcinogenic. Diesel manufacturers have to prove that their engines will not pose an unreasonable risk to the public health. EPA apparently believes that its emission standards are proper and achievable, and that the only acceptable level of a risk of carcinogenicity is zero. The result of EPA action may be the abandonment of the diesel engine, which achieves better fuel economy than any gasoline engine of similar performance.

by John F. Judge
Publ: Government Executive v11 n7 p37 (Jul 1979)
1979
Availability: See publication

HS-026 525

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL

In a joint industry-government program, the Dept. of Energy (DOE) and a number of auto and electrical equipment manufacturers are attempting to update the public's knowledge of the new electric cars and to accelerate technological developments. Displays in 1979 at DOE reflect advances made since World War I; new electric car models, marketable today, from four small contracting firms have been exhibited. A DOE-funded conference held in Washington, D.C. on 25-29 Jun 1979 examined the state of the art and future technology. Chrysler Corp. and Globe-Union Battery Co., both as subcontractors to General Electric, unveiled the DOE-sponsored Electric Test Vheicle (ETV-1). In general, experts do not foresee a mass market for electric cars until the late 1980's. In mass production, it is estimated that the ETV-1 could sell for about $6400. Interestingly, safety was an important point in favor of electric cars in the first part of the century. Proponents point out the nonpolluting feature of electric cars, but speed is an issue that continues to plague the electric car makers. Factors that hurt the electric car in the early 1900's were inadequate recharging stations in rural areas, and higher initial cost and higher energy prices than for gasoline-powered cars. Today the gasoline price/ availability situation puts the electric car in a more favorable light, and the price of today's electric cars could be competitive in the future.

by David A. Turner
Publ: Energy Insider v2 n14 p4-5 (9 Jul 1979)
1979 ; 3refs
Pages are oversized (approx. 11" x 14").
Availability: See publication

HS-026 526

THE ENGINEER'S DIET. PT. 1

A driving/maintenance plan for an individual car owner to follow in order to reduce his car's fuel consumption is presented. Careful braking saves fuel. The difference in gas mileage for city vs. highway driving is almost entirely due to energy lost to braking in the city cycle. By avoiding traffic jams, a motorist can save gas as well as time. Careful planning of vehicle speed saves fuel. Mileage improvement is approximately linear from 55 mph down to the 30-to-40-mph range; below 30 mph, fuel economy typically begins to drop off. Fuel consumption increases at higher speeds; fuel economy may drop from 10% to 20% as speed is increased from 55 mph to 70 mph. Planning tire maintenance saves fuel. Fuel is consumed in overcoming rolling resistance, the primary contributor of which are the tires. Dropping the inflation pressure of a fully loaded radial from 24 psi to 16 psi increases rolling resistance by 31%, for about a 6.2% increase in fuel consumption. Increasing the pressure in the same tire from 24 psi to 32 psi brings only about a 2.2% improvement in economy, and 40 psi increases it by only an additional 1%. Somewhere around 30 psi is an excellent compromise between ride harshness and fuel economy. Tire pressure has an effect on fuel consumption at least as significant as the 55 mph speed limit. Driving slowly with a cold engine saves fuel at a minimal risk of increased engine wear. As soon as the engine will stay running, it should be driven away; prolonged warm-up is very wasteful. Combining as many short trips as possible into one long one also saves gas. An account of the Mobil Economy Run is provided in a separate section.

by Patrick Bedard
Publ: Car and Driver v25 n2 p69-73 (Aug 1979)
1979 ; 1ref
Pt. 2 is HS-026 836. At head of title: Making the Mileage.
Availability: See publication

HS-026 527

ENERGY CONSERVATION IN TRANSPORTATION

Twelve selections are presented from the literature generated by the energy crisis of 1973-4, for acquainting the non-technical reader with some of the terminology, policy issues, problems and solutions proposed, as well as for showing the range of responses to the issue. Eleven chapters are based on a study or document sponsored by a U.S. Government agency and chosen to illustrate a particular approach to energy conservation in transportation as seen at the time. Some of the recommendations were later incorporated into Federal policy; others were not. The twelfth selection assembles critical data developed since the energy crisis. The first section deals with private motor vehicles, discussing the impact of the energy crisis on daily household travel and public attitudes toward the energy shortage, the implications and consequences of the 55-mph speed limit, the effectiveness of carpooling, and the rationale underlying the fuel economy standards imposed for 1981 through 1984. Mass transit is considered as a more energy efficient alternative to the automobile, with possible ways of encouraging a shift from private automobiles to mass transit, and two methods of providing increased transit capacity to meet the growing demand. Improvements in rail freight transportation are proposed, and the intercity passenger train is discussed in relation to energy consumption and conservation. Strategies for airline fuel conservation are developed and analyzed. The most currently available analysis is presented of energy demand and conservation in all these modes of transportation, plus waterways and pipelines. The original reports are available from NTIS.

Department of Transportation, Transportation Systems Center,
Kendall Square, Cambridge, Mass. 02142
1979 ; 127p 127refs
Previously announced papers included are: Ch. 1, HS-019 226; Ch. 2, HS-017 631; Ch. 4, HS-020 346; Ch. 5, Support Paper, HS-803 184; and Pt. 4, HS-024 295.
Availability: Corporate author

HS-026 528

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]

The Environmental Protection Agency's (EPA) proposal for a five year reduction in new motorcycle noise levels is opposed. The EPA would "certify" each new machine's quietude at a cost to the buyer of $200 to $400 per motorcycle. Opposition to the proposed regulations in 1978 was so strong, with nearly 60% general opposition and nearly 90% from motorcyclists, that the EPA gave up its attempt. In spite of the claim of the American Motorcyclist Association (AMA) that the proposal would be inflationary, it was renewed in 1979. An active campaign against it is urged. Ed Youngblood of AMA stated (May 1979) that the AMA favored a uniform nationwide standard for motorcycle noise, but found EPA'S plan inflationary and unreasonable. EPA's own data reveal that 88% of American motorcyclists (6 million people) maintain quiet machines at 83 db(A) or less; only a minority modify or fail to maintain their exhaust systems. EPA's plan does nothing to attack this real minority source of excessive noise. Estimates of the cost increase involved vary from EPA's possible $140 for 78 decibels, to the Council on Wage and Price Stability's (COWPS) $375 per vehicle, and some manufactures' $400. Charts demonstrate the cost to the motorcycle owner and the disproportion of costs vs. benefits. A survey among members of the AMA showed consumer acceptance of the increase involved in accepting the new standards dropping off rapidly beyond the $50 figure. The COWPS also found any reduction beyond 83 db(A) of questionable value, and beyond 80 db(A) intolerable and totally unjustifiable.

Publ: American Motorcyclist v33 n7 p17-9, 23 (Aug 1979)
1979
Availability: See publication

HS-026 529

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)

A final report is made on Phase 2 of the project "Driver Improvement--Development of Psychological Measures for the Rehabilitation of Traffic Offenders." To develop a training program for traffic offenders utilizing the principles of learning theory, sociodemographic data and information on driving records were collected on approximately 70 persons participating in the courses. Analyses of court records and questionnaires answered by the participants are discussed and evaluated. A description is given of the further development of "problem-oriented training" for drivers tested initially at one penal institution as a preparation for the organization of courses at various Austrian institutions. The main modifications in this training, which includes elements of patient oriented psychotherapy and of group dynamics, in addition to elements of behavior therapy, consisted in extending the number of group sessions from four to six, each lasting 2 to 2-1/2 hours, and in emphasizing guidance in self-control. The plan of study for Phase 3 is given, emphasizing the necessity of taking supplementary measures as soon as possible to use this training program as a preventive measure.

by L. Schmidt; H. Michalke; E. Klebel
Kuratorium fur Verkehrssicherheit, Verkehrspsychologisches Inst., Vienna, Austria
1978 ; 180p 35refs
Translated from German (original 110p; translation 70p).
Summary also in French
Availability: Reference copy only

HS-026 530

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. FINAL REPORT

Findings and recommendations are presented on the following issues: the nation's transportation needs, both national and regional, through the year 2000; the ability of our current transportation systems to meet the projected needs; the proper mix of highway, rail, waterway, pipeline, and air transportation systems to meet anticipated needs; the energy requirements and availability of energy to meet anticipated needs; the existing policies and programs of the Federal government which affect the development of our national transportation systems; and the new policies required to develop balanced national transportation systems which meet projected needs. Baseline information is provided on current transportation activities and institutions, on present Federal, state and local transport policies and programs, and on those of other developed countries. Three scenarios are presented to encompass future economic and social anticipations, with technological changes specific to transportation and communications affecting transport markets up to the year 2000. The effects on pollution and safety resulting from and influencing transport forecasts are presented, as well as energy demand and supply projections. Forecasts are made of passenger and freight activity from 1975 to 2000, by market rather than by mode. Capital requirements of all transportation demand forecasts are estimated. All the National Transportation Policy Study Commission forecasts, except petroleum regulation, were based on status quo policy assumptions. New policies are recommended to develop balanced transportation systems under the following six major policy themes: national transportation policy should be uniform; there should be an overall reduction in Federal involvement; economic analysis of intended Federal actions should be used; when the transportation system is used to pursue social goals, it should do so in a cost-effective manner; Federal involvement in (including financial assistance for) transportation safety and research is required; and users and those who benefit from Federal actions should pay.

National Transportation Policy Study Commission, 2000 M St., N.W., Suite 3000, Washington, D.C. 20036
1979 ; 537p refs
For Executive Summary, see HS-026 531.
Availability: GPO

HS-026 531

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. EXECUTIVE SUMMARY

National Transportation Policy Study Commission, 2000 M St., N.W., Suite 3000, Washington, D.C. 20036
1979 ; 39p
For abstract, see Final Report, HS-026 530.
Availability: GPO, stock no. 052-003-00684-7

HS-026 532

HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?

An attempt was made to clarify the effect of varying combustion rate over a range of engine speed, load, EGR (exhaust gas recirculation), octane number, and compression ratio (CR), on NOx (nitrogen oxides) emissions and fuel consumption. The study involved firing one, two, three, four, or five spark plugs in a single cylinder Ricardo E6 engine equipped with an open disc combustion chamber. The use of multiple spark plugs increased the combustion rate of the air-fuel mixture charge, which varied with firing spark plug position. Extreme values of speed, load, and number of ignition points showed that by using four spark plugs, the burn time could be halved, while brake specific NOx increased by 13% to 113% and fuel consumption decreased by 7% to 28%. There was only a slight difference in fuel economy between slow and fast burn conditions when varying the air-fuel ratio (A/F). Reducing the burn time increased the NOx emissions for all loads, fuels, and combustion systems. Indicated specific NOx (ISNOx) emissions were not a unique function of burn rate. Spark plug two (closest to exhaust valve) gave significantly more NOx than others. The addition of a shrouded intake valve reduced ISNOx emissions at light load and increased combustion rate. Addition of extended electrode spark plugs increased NOx and combustion rate in some cases. ISNOx increased with combustion rate at zero EGR rate, and decreased while combustion rate increased at high EGR rates. As the EGR rate increased, NOx levels became increasingly higher than corresponding levels at 7:1 CR at the same burn rate. Increased CR gave decreased burn time. The crossover EGR value above which shorter burns reduce NOx was over 20% EGR rate at 18:1 A/F. A study of the effect of combustion rate on octane requirement showed that the tendency to knock with four spark plugs operating was greater at lower CR's associated with lower octane fuel than it was at higher CR associated with higher octane fuel.

Publ: Automotive Engineering v87 n7 p74-5 (Jul 1979)
1979
Based on SAE-790387 "The Effects of Varying Combustion Rate in Spark Ignited Engines," by R. H. Thring.
Availability: See publication

HS-026 533

POWER STEERING SYSTEM VARIES ASSISTANCE WITH SPEED

A velocity-sensitive type of variable-assist power steering introduced by Honda provides full steering assistance at low speeds, gradual reduction in assistance with increasing vehicle speed, and a normal unassisted "road feel" at highway speeds. The device operates on a rack and pinion steering gear, and is powered by a gear-type hydraulic pump driven by the engine. The speed sensor is a trochoid-gear hydraulic motor, driven by the pressure in the speed sensor line with its rotational speed governed by the speedometer gear shaft in the transmission. This power steering system causes the maximum amount of steering effort at a given speed to be governed by that speed, regardless of road surface resistance. The driver road feel is proportional to the road resistance, and the front wheels are turned by both hydraulic power and driver effort. In the event of failure of the system, the steering will revert to manual control. A failure in the speed-sensing mechanism results in more steering effort at low vehicle speeds rather than excessively light steering at high speeds.

Publ: Automotive Engineering v87 n7 p70-2 (Jul 1979)
1979
Based on SAE-790738 "A Speed Sensitive Variable Assistance Power Steering System," by Masao Nishikawa, Yoshihiko Toshimitsu, and Takashi Aoki.
Availability: See publication

HS-026 534

DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY

Swirl-type direct injection (DI) diesel engines show marked differences in their response to increased injection rates, probably due to differing degrees of liquid impingement on combustion chamber walls resulting from different air inlet ports, air motion, and corresponding best nozzle configuration. A "rate parameter" correlates fuel injection rates with BSFC (brake specific fuel consumption), smoke, carbon monoxide, and nitrogen oxides (NOx) for non-impingement conditions, but beyond a "maximum useful rate" (MUR), NOx continues to increase while there are no further reductions in the first three items. Overall optimum impingement rate is less than MUR in practical cases, and is a function of various emissions and system response to injection rates and timing. In principle, an injection rate corresponding with the MUR should be used to obtain best possible fuel economy and least smoke regardless of emissions and noise. High-swirl, impinging DI engines require only a 15% injection rate increase for best fuel economy and least smoke, and this can be achieved with present injection equipment. A non-impinging DI engine requires a 33% injection rate increase relative to currently used values, with a consequent increase in fuel injection equipment cost. NOx emissions can be reduced by retarding fuel injection timing. An injection rate increase may then be beneficial in minimizing BSFC or smoke increase associated with injection timing retard. Optimum injection rates for best BSFC and smoke, combined with NOx emissions of about 8.7 g/kW.h, varies from 0% to 25% above normal fuel injection rates, depending on design. Computer model calculations show that very short burn-times to improve cycle efficiency have a penalty of increased convective heat loss with increased fuel-air mixing rate. These calculations also indicate the relative cycle efficiencies for high swirl mixing systems of an indirect injection engine, a conventinal swirl DI engine, and an adiabatic engine.

Publ: Automotive Engineering v87 n7 p60-4 (Jul 1979)
1979
Based on SAE-790037 "Response of Diesel Combustion Systems to Increase of Fuel Injection Rate," by G. Greeves.
Availability: See publication

HS-026 535

POWERPLANT EFFICIENCY PROJECTED VIA LEARNING CURVES

An approach to technological projections for automotive powerplants can be based on learning curves such as those characterizing certain human efforts. Historical learning curves can be constructed for such alternatives as the diesel engine, gas turbine, rotary, and other powerplants. Since most developments proceed along evolutionary paths, projections of their progress toward 1990 may be made, using a range of plausible slopes. Learning curves are presented and discussed which provide insight into the development and fuel economy potential of various types of automotive engines, including prechamber and open chamber stratified charge internal combustion engines, turbocharging of diesel engines, dual displacement and variable displacement engines, the Stirling and Rankine engines, and combined cycle engines. The curves are based on fuel-economy-related work which was mainly sponsored by the National Hwy. Traffic Safety Administration.

Publ: Automotive Engineering v87 n7 p52-8 (Jul 1979)
1979
Based on SAE-790022 "Fuel Economy of Alternative Automotive Engines: Learning Curves and Projections," by Roy Renner and Harold M. Siegel.
Availability: See publication

HS-026 536

ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS

On-board computers (OBC's), now available on certain car models, because of their versatility and cost-effectiveness may become part of the basic instrumentation package. In the Ford Versailles, the Electronic Engine Control provides an integrated control of the exhaust gas recirculation. The next level of improvement of OBC technology beyond interaction control will be adaptive control. Three important adaptations will enable OBCs to sense the actual component functions as they come together in a specific car and to adjust the powertrain controls for the unique combination of parts. Adaptation to altitude and temperature changes will be possible, as well as to driving conditions, possibly also to road surface and changing tire characteristics. Adaptation to system changes occurring over a longer time period may follow. In vehicle control applications, rapid logic operations, interrupt servicing, and multichannel output are more important than a large data base access. Therefore some form of distributed computer might be cost effective as applications spread throughout the vehicle. This approach simplifies the integration of dedicated or "stand-alone" electronics. In programming, the tiny read-only-memory unit completely defines the control function and stores the quantitative information specific to a car/engine combination. On-board computers may be made responsive to driver demand; many items of information buried in the engine control logic might be of interest to the driver. Diagnostic programs for preventive maintenance are also possible with the OBC.

Publ: Automotive Engineering v87 n7 p50-1 (Jul 1979)
1979
Based on SAE-790341, "Application of Electronic Systems at Ford," by Harold C. MacDonald.
Availability: See publication

HS-026 537

MATERIALS CHANGES AFFECT COOLING SYSTEM PERFORMANCE

Substitution of light alloys in automotive cooling systems must be accompanied by full consideration of their corrosion characteristics. The coolant should be recognized as a critical material, and a full-time, functional fluid. The use of a 50% to 70% mixture of a well-inhibited antifreeze-coolant will result in greater corrosion protection attributable to less coolant pump cavitation, reduced nucleate boiling erosion, and increased metal passivation. The basic mechanisms involved in cooling system corrosion are direct attack, electrochemical corrosion, and cavitation erosion. Three types of organic and inorganic inhibitors (anodic, cathodic, and adsorption) are used in anti-freeze-coolants to minimize corrosive attack. No single inhibitor will protect all cooling system metals. The proper selection of an inhibitor combination depends upon the metals used, composition of the coolant base, flow conditions, environmental temperatures, and heat flux at the heat transfer systems. Factors accelerating corrosion include galvanic couples, aeration, exhaust gas leakage, corrosion products, metal stresses, localized hot spots, high coolant operating temperatures, poor quality water supplies, and certain coolant flow characteristics. Aluminum coolant pumps are vulnerable to cavitation-erosion-corrosion in the presence of improperly inhibited, depleted, or diluted coolant. The extent of damage and the tendency to perforate is influenced by the pump design, as well as by improper fitting of hoses and hose clamps.

Publ: Automotive Engineering v87 n7 p44-7 (Jul 1979)
1979
Based on SAE-780919 "Cooling System Corrosion in Relation to Design and Materials," by E. Beynon, N. R. Cooper, and H. J. Hannigan.
Availability: See publication

HS-026 538

TORCH IGNITION SHORTENS COMBUSTION DURATION

The power and efficiency losses that normally accompany the slow burning of lean mixtures may be reduced by using a torch ignition system. The torch chamber provides turbulence which can reduce the combustion interval and possibly reduce exhaust emissions. The use of a directed torch nozzle enables the optimum torch jet direction to be found. In recent testing, a late-firing torch, in conjunction with a standard ignition system, was used to provide additional energy to supplement cylinder turbulence. The use of the late-firing torch provided a reduction in hydrocarbon emissions but increased fuel consumption.

Publ: Automotive Engineering v87 n7 p42-3 (Jul 1979)
1979
Based on SAE-790440 "Torch Ignition for Combustion Control of Lean Mixture," by Tim G. Adams.
Availability: See publication

HS-026 539

AIR-TO-AIR HEAT EXCHANGERS USED FOR DIESEL INTERCOOLING

An air-to-air intercooler system has been developed by Volvo Truck Corp. for cooling the charge air of its turbocharged diesel truck engines. The method is considered to be simpler and more efficient than air-to-water intercooling, with high reliability due to absence of moving parts. The system routes charge air from the outlet of the turbocharger through a heat exhanging radiator (mounted in front of the truck's regular radiator) and thence to the intake manifold of the diesel engine. Exhaust emissions are also decreased, primarily smoke and oxides of nitrogen. The increased air/fuel ratio improves combustion; specific fuel consumption should be improved as a result of better efficiency. The Volvo 6.7-L turbocharged diesel engine is made in two versions: the TD70G engine, the ordinary 156.6 bkW (210 bhp) version, and the TD70F, the same engine with air-to-air charge air cooling. Output of the TD70F is increased to 171.5 bkW (230 bhp) with the addition of the charge air cooler, which adds 22.7 kg of mass to the engine. A photograph and three diagrams illustrate the coolers.

Publ: Automotive Engineering v87 n7 p30-2 (Jul 1979)
1979
Based on SAE paper 790770, "Air-to-Air Charge Cooling for Truck Engines," by Bertil Haggl and Ernst Holmer.
Availability: See publication

HS-026 540

THE IMPACT OF THE SMALL CAR

Conditions and events causing the trend to small cars are discussed. Social changes, legislation, the capabilities of the carmakers, and the energy question are all crucial and interdepedent factors. For over a decade government regulations have set up technological objectives to produce safer, cleaner cars (90% cleaner in hydrocarbon emissions than the pre-regulated cars of the 1960's, 82% cleaner in carbon monoxide emissions, and 51% fewer oxides of nitrogen). With the development of the fuel-efficient small car, the carmakers foresee a need for more service outlets and highly skilled mechanics, with a great increase in parts inventories throughout all levels of distribution. The stocking up of parts and accessories for small cars by the retailer is seen as essential, since the change from large to small vehicles is a permanent one. The recent increase in the van/light truck market supports the idea that practicality is a growing consideration. Figures for the first three months of '79 suggest that of the million-plus vehicles sold, nearly 60% fall into the compact, sub-compact or import categories, and it is estimated that by the 1980's at least a third of the market will fall into the subcompact category. Studies show that Americans are holding onto their large, older cars longer, because the purchase of a new small car is not always cost-effective for those families who still need a larger car or light truck. The challenge to the vehicle industry is to continue to provide at least some of the service mobility, comfort and convenience that the public needs and expects.

by Debbie Essell
Publ: Automotive Marketing v8 n6 p30-1, 33-6 (Jun 1979)
1979
Availability: See publication

HS-026 541

TIRE TECHNOLOGY FOR THE TIRE DEALER

Principles of tire manufacture are presented to assist tire dealers in discussions with customers and in training personnel. Tire functions are listed as carrying loads, transmitting driving and braking torque, cushioning road irregularities, developing cornering and directional stability forces, providing mobility, and avoiding flotation, as well as providing low heat buildup, low rolling resistance, and high abrasion resistance. Main tire components include the casing, the bead, and the rubber covering. Trends in the tire market, and tire volume vs. raw material consumption are discussed. A table of the weight breakdown of tire materials by size and construction is provided, as well as a glossary of tire terms and schematics of cross sections of a bias truck tire and a steel belted radial passenger car tire.

Smithers Scientific Services, Inc., Akron, Ohio
Publ: NTDRA Dealer News v42 n13 p9-14 (9-16 Jul 1979)
1979
Availability: See publication

HS-026 542

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE

Recent National Tire Dealers and Retreaders Assoc. investigations reveal that among several factors contributing to inadequate bond line adhesions and tire failure, the two most common are heat and the oil content carbon black combinations in lower grade or highly oil-extended compounds. Misapplication of tread rubber (using a low-grade passenger car tread rubber for truck tire retreading) causes flex fatigue problems resulting in premature chunk outs or tread lifts, especially in hot weather. Data from laboratory bond line adhesion study on five grades of tread rubber from the same manufacturer show that the better grades have superior heat aging and flex fatigue properties. Laboratory studies also show that physical properties of tread rubber deteriorate rapidly at sustained elevated temperatures. Use of highly oil-extended tread rubber compounds could create an oil migration problem at an interface (the buff line, in retreading) when a difference in oil concentration exists between two rubber stocks. The migration of oils from the uncured treat rubber to the buffed casing alters the physical properies of both, and contributes to flex fatigue problems. In separate sections, a news item indicates that the energy crisis will increase the volume of retreading business, and correct methods of repairing nail hole punctures are explained and illustrated.

Publ: NTDRA Dealer News v42 n13 p17-20 (9-16 Jul 1979)
(Retreader's Guide to higher efficiency and profits n4)
1979
Availability: See publication

HS-026 543

CAR MAKERS. WHERE THEY'LL TAKE US TOMORROW

It is predicted that the internal combustion piston engine will continue to be the chief automotive engine in 1985. Fuel saving features will include such changes in the drive train as lock-up torque converters, built-in over-drives, changes in gearing, and more speeds. Run-flat tires, eliminating the spare, and high pressure radials will be more common, with fabricated aluminum and high-density fiberglass wheels envisioned in the future. Factors influencing automotive technology after 1985 will be need for energy sources other than conventionally derived petroleum, need for further fuel economy improvement, and control of emissions and pollutants. Electronics will be important in providing precision of engine control; the three-way catalyst, soon to be a key emission control device, requires accurate control of the fuel/air ratio; the electronic feed-back carburetor is a comparable component. More sophisticated computer-controlled systems are planned for the next few years. In weight reduction, the key materials are aluminum, plastics and high strength steel, all of which will be used more in the '80s. Other changes include greater use of thin glass to save weight, and of more galvanized steel, special paints and treatment for corrosion control. A possible reduction in the price of graphite fibers would permit their use in structural applications as graphite-reinforced plastic. Changes in design and in engine and drive-line components are cited for the 1979 model year. Charts show current and future projections of the movement toward smaller cars in the domestic and import markets.

by Russ Hamilton
Publ: Automotive Marketing v8 n6 p41-2, 44 (Jun 1979)
1979
Availability: See publication

HS-026 544

OFFICIAL WATCHDOG...A MOTORIST'S BEST FRIEND?

Gordon Borrie, since 1976 the Director-General of the Office of Fair Trading in Britain, finds that motoring complaints take up the greater part of his department's time. In 1978, when a survey revealed that 67% of all new cars needed repairs in their first five months on the road, he notified the responsible companies, allowing time for corrections; if the percentage continues as high, he plans to make his findings known to the public. Mr. Borrie has campaigned against the "rogue" car dealers, usually not members of the motor trade associations, who turn back mileage readings on used cars, make unnecessary or botched repairs, and sell unroadworthy cars. He estimates that such unscrupulous firms were responsible for a majority of the 60,000 car complaints his office received in 1978. A network of trading standards officers throughout the country monitors complaints and gathers facts about local "problem" firms. His powers included, since July '78, the authority to withhold, suspend or revoke a Consumer Credit Act licence, by which a dealer arranges hire purchase for his customers, and to demand a written promise of future good behavior from an unfair dealer with the sanction of court action if the promise is refused or broken. These powers are limited in comparison with those of his counterparts in a number of European countries, and their effectiveness is still to be determined. Various codes of practice can be devised to protect motorists, such as regulations for the selling and service of tires, and a major code, operating since 1976, covering new-car deals and repairs. Compulsory membership in a trade association is opposed, as it would cut competition and drive up prices, and the public may get as good or better service from a small garage as from a large concern.

by Howard Walker
Publ: Motor v156 n4004 p47-8 (4 Jul 1979)
1979
Availability: See publication

HS-026 546

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE

A study initiated in 1978 of FHWA'S safety-related information needs includes accident data, data relating to exposure to accidents and to costs of accidents and countermeasures, as well as other information. The study was designed to determine the safety-related information needed to the foreseeable future for carrying out FHWA'S motor carrier safety and highway programs. This included evaluation to insure that only the most essential information is collected, identification of potential sources for supplying critical missing data, and determination of resource requirements for providing and utilizing needed information. A 10-person task force was established. After presenting the legislative background of Federal highway safety programs the report describes the study approach, and lists results of the analysis. These provide documentation of current and foreseen FHWA safety-related information needs, with systematic priority ranking of such needs, and classfication of information items as to importance, availability, usability and sources. Recommendations are made, designed to lay a foundation for administering the program, building upon resources currently existing in FHWA, the States and other public and private organizations. Tables listing program areas, decisions, and information data are appended.

Federal Hwy. Administration, Washington, D.C.
1979 ; 305p 12refs
Availability: Corporate author

HS-026 547

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION

Laws requiring seat belt use have had some limited success in reducing occupant fatalities, although fatality reductions have been considerably less than expected from the reported increases in belt use rates. Belt use by persons involved in crashes has not increased to the same extent. Occupants most likely to be in serious crashes are least likely to increase their use of belts in response to laws. Many involuntary belt users comply with belt use laws by wearing their belts incorrectly, in ways that greately reduce their effectiveness. Many persons in front seats who wear belts in response to laws are susceptible to being impacted in crashes by unbelted rear seat occupants. It is recommended that laws apply to all or most vehicle occupants, that there be no weakening of the law once passed, and that there be strong enforcement and appropriate publicity. The incomplete success of belt use laws does not reduce their importance, but does reinforce the importance of providing automatic ("passive") protection to vehicle occupants as an alternative or supplementary measure.

by Allan F. Williams; Brian O'Neill
Insurance Inst. for Hwy. Safety
Rept. No. SAE-790683 ; 1979 ; 11p 36refs
Technical Paper Series. Presented at Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979.
Availability: SAE

HS-026 548

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS

Some exploratory studies are reported, aimed at evaluating the conspicuities (attention-attracting powers) of a group of commercial warning lights meant for use on emergency vehicles. The main experiment used a novel technique of conspicuity matching: each observer, in turn, fixated straight ahead and viewed two flashing lights peripherally, one located 20 degrees to the left of the fixation point, and one 20 degrees to the right. One of the two lights was always a reference light whose intensity could be adjusted by the observer until the two lights appeared equally conspicuous. All the lights were thereby ranked on a single scale of conspicuity, based on the adjustable-light intensities. There was a good correlation (r=0.90) between these ranks and the measured effective intensities of the lights. Another very brief pilot experiment ranked some of the lights according to the number of degrees into the left side of the visual field that the flashes could still be seen. This disappearance-angle rank also correlated well (r=0.86) with conspicuity rank. Among the problems encountered was the discovery that several of the test lights were more conspicuous than the reference light set at maximum intensity; this was solved by the use of a fixed neutral filter in front of the test lights. A procedural difficulty involved a partial fading of the visual field after steady gazing at the fixation cross; it is suggested that in future work a more limited, nonrigid kind of fixation be used. The rating of the tested commercial lights is tabulated and discussed. The feasibility and reliability of the new conspicuity-rating method are discussed, including the method's relationship to other measures. Results of a limited study of the effects of color are described. Future comparable experiments are recommended with variable factors affecting conspicuity.

by Gerald L. Howett
National Bureau of Standards, Washington, D.C. 20234
Rept. No. NBS-SP-480-36 ; 1979 ; 28p 12refs
Sponsored by National Inst. of Law Enforcement and Criminal Justice.
Availability: GPO, stock no. 003-003-02085-1, $1.50

HS-026 549

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978

About 3:40 p.m., p.s.t., November 11, 1978, a station wagon with 13 occupants exited from Interstate 10 onto a branch connection ramp. It was raining and the roadway was wet. As the station wagon negotiated the ramp, the driver lost control of the vehicle and it crashed through the bridge rail and fell to the roadway below landing on its roof. The driver and six passengers were killed and six passengers were injured. The National Transportation Safety Board determines that the probable cause of this accident was the driver's loss of control of the station wagon on the branch connection ramp, which resulted from the road surface's low coefficient of friction, the speed of the vehicle, the degraded condition of the vehicle, and the intoxication of the driver. The severity of the crash was magnified by the failure of the bridge rail, known to be inadequate by current standards, to retain the vehicle. Recommendations made to the State of California were: Until the accident site is improved, install "Slippery When Wet" warning signs and a 25-mph speed advisory sign; establish a policy and program consistent with Federal Hwy. Administration guidelines and standards to provide for upgrading substandard bridge railing that has been crash-damaged; expedite action on safety improvement at the accident location; and establish a program to retrofit, on a priority basis, bridge railing that does not meet Federal performance guidelines.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-5 ; 1979 ; 23p 7refs
Availability: NTIS

HS-026 550

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977

At 8:07 p.m. on September 25, 1977, an empty tractor-semitrailer was traveling eastbound on I-70 in downtown St. Louis, Missouri, when the truckdriver lost control of his vehicle on wet concrete pavement. The tractor struck, broke, and overrode a concrete median barrier, vaulted into the westbound lanes, and collided with a westbound automobile. All three occupants in the automobile died; the truckdriver was injured slightly. The National Transportation Safety Board determines that the probable cause of this accident was the loss of tractor-semitrailer control during evasive maneuvers made by the truck driver in response to improper lane changes by an eastbound automobile driver. Contributing to the severity of the accident were the barrier impact speed and attack angle of the tractor-semitrailer which may have only slightly exceeded the design limits of the functional "New Jersey" concrete barrier. Recommendations were made to the Federal Hwy. Administration for development of a more progressive pavement surface improvement program in Missouri, and for improvement in the performance of concrete barrier systems already in place. Recommendations to the Misouri State Hwy. Commission included corrective action in traffic routing and improvement in wet pavement surface policy.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-3 ; 1979 ; 23p 10refs
Availability: NTIS

HS-026 551

ISN'T IT TIME? [MOTORCYCLE RIDER EDUCATION]

The continuing dispute between government and motorcyclists over the helmet law overshadows more meaningful safety programs. Creation in 1973 of the Motorcycle Safety Foundation (MSF), funded by the five largest motorcycle manufacturers, stemmed from their concern about the lack of government leadership in motorcycle safety, especially in the area of education. After defining the 2,500 tasks a motorcyclist must perform, the MSF, with funding from the National Hwy. Traffic Safety Administration, developed a study to determine whether a particular skill is best taught via film, still pictures, the seat of a motorcycle, or other means. Three years of research and testing produced in 1976 the Motorcycle Rider Course (MRC). Instructor certification programs were developed at colleges and universities. NHTSA, while funding an effective training program, questions the concept of rider education, and advocates further preliminary study with a four-year demonstration project. Officers of the MSF oppose further delay. Illinois, when threatened with withdrawal of Federal highway funds because the state had no helmet law, asked if the money would be released for an education program, and this was allowed. This solution, if carried out in the other 49 states, might have turned the helmet controversy into a nationwide rider education breakthrough. In Illinois a training program based at seven regional centers has taught 11,000 beginning motorcyclists, with another 7,000 in training. Except for North Dakota, no political backing has been developed in any of the states for legislation on rider education. Programs for motorcycle safety training can best be promoted by individual cyclists, working in their communities. An accompanying article describes the development of a benchmark rider education bill in North Dakota, where ABATE now stands for American Bikers Aiming Toward Education. A $5 surcharge, added to the state's $6 motorcycle license fee, is used for rider education; the North Dakota Motorcycle Dealers Assoc. supplies training bikes for high schools wishing to offer the program. The only remaining hurdle is to persuade school districts to offer the course.

Publ: American Motorcyclist v33 n7 p20-3 (Aug 1979)
1979
Availability: See publication

HS-026 552

TIME FOR CHAIN MAINTENANCE [MOTORCYCLES]

Methods are discussed and illustrated for proper adjustment and lubrication of a motorcycle chain, as well as evaluation of its condition for possible replacement. Precise alignment of the rear wheel is necessary for proper chain adjustment. Chain lubrication tips include application of lubricant to the edges of the linkplates, preferably while the chain is warm (after riding), and allowing the lubricant to soak in before riding the motorcycle.

by Bill Hampton
Publ: Popular Mechanics v152 n2 p114, 140 (Aug 1979)
1979
At head of title: Your motorcycle.
Availability: See publication

HS-026 553

1,849 FAMILIES REPORT THEIR AUTO CRASH EXPERIENCE

Auto insurance is the single most important source of benefits for persons injured in automobile crashes, according to a consumer survey of 1,849 families from the third major study conducted by the All-Industry Research Advisory Committee, which includes pending as well as resolved claims, plus information on benefit sources other than auto insurance. The families reported that auto insurance provided 67.5% of total reimbursement; group health insurance was next with 22.3% of total payment. All government benefit programs combined provided 5.6%, workers compensation 3.5%, and all other private insurance sources 1.1%. More than 97% of persons injured in auto crashes have at least one potential source of payment. About 92% of the families were covered by auto insurance and 84% by group health insurance. Only about 16% had collected from more than one source when economic losses were $500 or less; when losses exceeded $5,000, about 61% received payment from two or more benefit sources. As a group, persons who collected from a single source received an average of $1.42 for each dollar of economic loss sustained; for those collecting from two sources, payments equalled $1.33 for each dollar of loss; the few collecting from three different sources averaged $1.56 per dollar of loss. Persons with small economic losses received more reimbursement per dollar of loss than those with large losses, under all types of benefit sources, government as well as private. Payments in relation to economic loss were higher for persons whose injuries produced no permanent disability than for those with permanent physical impairments. Residents of large cities collect the most reimbursement per dollar of economic loss. Enactment of no-fault laws has caused changes; auto insurance provided a larger percentage of reimbursement in the no-fault states than in the traditional tort states, while group health insurance provided slightly less reimbursement in the no-fault states than in the tort states. Of the 1,849 respondents in the survey, 407 had not received payment from any source although some still had claims pending or had not yet filed a claim. The uncompensated persons tended to have small losses (2/3 had losses of $300 or less) and were concentrated in rural areas where single-vehicle crashes are more prevalent. A disproportionate percentage came from the tort states, where fault is often a bar to reimbursement.

Publ: Journal of American Insurance v54 n4 p11-2 (Winter 1978-79)
1978
Availability: See publication

HS-026 554

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY

A report of three separate studies by the All-Industry Research Advisory Committee indicates that persons in the 16-24 age group, who make up 17% of the population, accounted for over 30% of the injuries covered by insurance, especially catastrophic injuries. Persons under 16 and over 65, had fewer incidents of auto-related injury than their population share, and the 25-64 age group reported auto injuries roughly in proportion to their share of the population. The first study reported injury claims settled countrywide during a two-week period in 1977. The second study involved catastrophic injury cases (payments estimated at over $100,000) in Michigan, Pennsylvania, and New Jersey, where no-fault laws provide unlimited medical benefits. The third study surveyed about 60,000 families to identify those receiving injuries in recent auto accidents. The families reporting injuries (5%) were sent detailed questionnaires concerning extent of injury, economic losses (including wages), and compensation from various sources. The data from these studies indicate that young people present greater risk to an insurance company than older people; that auto injuries are a predominantly urban phenomenon (70% in closed claims study); and that injury claims are generated by persons other than the insured (policy holders were drivers in 60% of injury-producing accidents). The studies have provided data useful for evaluating the performance of the auto accident compensation systems in various states, including those with no-fault laws. No-fault is found to have brought major changes in methods of payment to auto accident victims. No-fault coverages have been extended to groups of auto accident victims previously ineligible (e.g. single-car accident victims). The shift toward no-fault compensation has caused a somewhat greater portion of the auto insurance claim dollar to go to reimbursement of economic losses in no-fault states and a lesser portion to "general damages" or intangible losses. Claimants for fault-related benefits were more often represented by attorneys than claimants for no-fault benefits. Claimants represented by attorneys did not always receive more reimbursement, and cases involving attorneys generally took much longer to settle.

HS-026 555

Publ: Journal of American Insurance v54 n4 p6-10 (Winter 1978-79)
1978 ; 1ref
Based on a two-volume report, "Automobile Injuries And Their Compensation in the United States."
Availability: See publication

HS-026 555

WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE

Some progress is reported in dealers' reimbursement from automobile manufacturers for warranty work, since in most cases labor charges are paid at retail rates. Present problems seem to involve prices of replacement parts. Misunderstandings between the dealer and the manufacturer occur because warranty repair procedures are not clear-cut. Proper documentation of repair by service managers, a larger profit margin for dealers, and improved communication between dealer and factory are recommended. Company audits are considered unreasonable by dealers. An advance warranty credit program has been instituted by Datsun, similar to those of Ford, General Motors (GM) and Chrysler. Ford and GM also offer large-scale dealers direct warranty communication with the factories by computer. Smaller dealers cannot afford this service. Ford's Direct Warranty Entry system facilitates payment of warranty repair orders (RO'S), but proper filling out of RO'S is still important. One service manager considers that the dealers have no recourse in warranty work reimbursement disputes except mandatory arbitration or government regulation.

by Mo Mehisak
Publ: Automotive Age v28 n6 p62-5, 67-8 (Jun 1979)
1979
Availability: See publication

HS-026 556

TRANSIT DAMAGE: TROUBLE ALONG THE WAY

Shipments of new automobiles en route to the dealer are vulnerable to accident, theft, vandalism, and careless loading and unloading. A key problem for the dealer is the lack of uniform regulations or industrywide standards specifying what is acceptable damage and what must be disclosed to the customer by the dealer or to the dealer by the manufacturer. In four states dealers must disclose any unrepaired damage, as well as repaired damage in excess of a level set by law--glass, tires and bumpers are not included. Three other states have legislation pending. Consumer protection laws help the buyer but are of no help to the dealer who receives a slightly damaged car from the manufacturer. Seriously damaged vehicles are usually destroyed, but others may be repaired for use in company service or donated to schools for use in training mechanics. Ford Motor Co. specifies that vehicles damaged in excess of $300 are not delivered to the dealer, but repaired by the manufacturer and placed in company service or wholesaled as used cars; those with less damage are sent to the dealer for repairs. In this plan, there is a lack of correlation between dollar value and extent of damage, variation in repair procedures and local labor rates, and in acceptability by consumers in different parts of the country. Transit damage is considered a minor problem by dealers in the Midwest and Western states, where railroads have high-speed runs over well-maintained track, while eastern lines move slowly over poor track in congested urban areas, and are subject to severe damage, especially vandalism and pilferage. Auto transit damage generates more claims than any other category

of freight, accounting for 28% of all loss and damage claims f railroads. Payouts totaled $85 million in 1978, when over million vehicles were carried, with an estimated 11.9% damag along the way. The rail cars used to ship automobiles are no being enclosed and manufacturers are improving protection the cars themselves. With new equipment and careful personn training, Toyota has reduced its damage rate on shipping fro 50% to 2%. Despite improvements in the past few years, caref checking by experienced personnel is recommended; deale should be aware of their legal liability in their state, and wo for better legislation.

by Larry Tuck
Publ: Automotive Age v28 n6 p52-61 (Jun 1979)
1979
Availability: See publication

HS-026 557

THE NEAR-ACCIDENT. LEARN FROM YOUR MISTAKES--PLEASE

The "near-accident" caused by the driver himself should serv as a warning to him; he should analyze his driving habits to se if this is a habitual error, and then make a conscious effort t correct the fault. Typical errors illustrated include failing t look behind when making a lane change, following too closely and careless exits from parking lots.

Publ: Driver v13 n1 p4-6 (Jun 1979)
1979
Availability: See publication

HS-026 558

SPARKING PLOTS [PARKING LOTS]

A list of faulty practices commonly found in parking lots is illustrated by photographs. These include driving against the traffic; parking the wrong way, too close to the next car, or taking up more than one parking space; bumping the next car with your door; occupying space reserved for the handicapped; leaving shopping carts in the parking area; cutting across the lot; speeding; backing out without looking; and parking too far over the center line. Extra alertness by drivers is urged to compensate for faulty pedestrian practices.

Publ: Driver v13 n1 p14-9 (Jun 1979)
1979
Availability: See publication

HS-026 559

HOW TO AVOID GETTING RIPPED-OFF: BRAKES

To avoid excessive repair charges, it is best to know beforehand what needs to be repaired and about how much it should cost. Automotive manuals can provide illustrations of the needed parts and their locations. A reliable repair shop can often be found through word-of-mouth; the Better Business Bureau can provide information about any unusual number of complaints against a particular firm. Since a woman alone is more apt to be ripped off, a man should go along even if he knows nothing about brakes or cars. Recommendations for a good drum brake overhaul includes: new brake linings all around; new front grease seals; resurface (grind) all drums; four new (or at least rebuilt) wheel cylinders; replacement of return springs and hold-down hardware; repacking front wheel bearings; master cylinder inspection; bleed and flush hydraulic system; road test, and final brake adjustment. A good brake job for disc/drum systems should include: new disc pads and new linings; new disc hardware, new return springs and hardware; rotors resurfaced or replaced, drums turned (ground); calipers and wheel cylinders overhauled or replaced; new front grease seals; repacking front wheel bearings; master cylinder inspection; bleeding and flushing hydraulic system; road test, and final brake adjustment. Dishonest practices include repairing drums or wheel cylinders and charging for new ones, and charging a premium rate for cheap pads; charging flat-rate for repacking the wheel bearings and rotating tires when the combined time is much less when everything is already disassembled; damaging other parts of the vehicle while working on it and then recommending repairs. Knowledge of the car's condition before it goes in the shop is advised. It is best to specify riveted, rather than bonded, brake shoes. The mechanic should check the brake lines and hoses, the white plastic check-valve mounted on the master cylinder vacuum unit, and the master cylinder. Always have the drums or discs "turned" or machined when replacing linings or pads; buy "heavy duty" or premium, but not "competition-rated" linings and pads. When traveling, it is wise to go to one of the major service centers with branches nationwide where a warranty will probably be honored.

Publ: Driver v13 n1 p20-2, 25-7 (Jun 1979)
1979
At head of title: The Backyard Mechanic: A Guide to Consumer Survival.
Availability: See publication

HS-026 560

THE VISUAL PERCEPTION OF MOTION IN DEPTH

From a theoretical model of the operations of the visual system underlying the perception of motion in depth, it now appears that information concerning this motion is processed in two distinct channels, which converge on a single motion-in-depth stage of the human visual perception system. The experiments leading to the current view of how the visual system responds to a stimulus are reviewed. A "changing-size" experiment is described which involved fatiguing a particular channel of a subject's selective adaptation system in order to sort out the neural organizations involved in different perceptual tasks. The experiment was extended to measure human visual sensitivity to flow patterns, the major stimulus correlate of motion available to a pilot landing an airplane. Both changing image size and flow patterns are compelling clues to motion in depth which play a role in both monocular and binocular vision. The perception of stereoscopic motion resulting from interactions of signals from the two eyes, and of stereoscopic position, are accomplished by quite different neural mechanisms. The use of the stereoscope is described to demonstrate how the brain utilizes the geometric difference between the right and left retinal images of a solid object. Later experiments of motion perception include those on the relative velocities of the left and right retinal images of an object and experiments (technique of stereoperimetry) to demonstrate that information on position in depth and on motion in depth are processed by different channels. The selective response of neurons to movement along a particular direction in depth was demonstrated by recording the firing patterns of single neurons in the visual cortex of anesthetized cats. Field experiments, suddenly depriving jet pilots of the vision of one eye during landings, indicated that landing performance suffered little and in some cases improved. There is found to be no simple answer to the question of how the sudden loss of binocular vision affects the perception of motion in depth, because the ratio of visual sensitivities to the binocular stimulus of changing disparity and the monocular stimulus of changing size depends on the size and velocity of the object viewed, on the inspection time, and very much on the individual.

by David Regan; Kenneth Beverley; Max Cynader
Publ: Scientific American v241 n1 p136-7, 140-5, 148-51 (Jul 1979)
1979
Availability: See publication

HS-026 561

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978

About 3:30 p.m. on August 22, 1978, an ambulance transporting a cardiac patient to a hospital and traveling at a calculated speed of 90 to 95 mph failed to negotiate a curve on New Hampshire State Route 116 east of Littleton, New Hampshire, and rolled over. Two persons in the ambulance were killed and the driver was injured. The patient had died before the accident. The National Transportation Safety Board determines that the probable cause of this accident was loss of control of the ambulance, which had oversteer characteristics, by an unskilled driver at a high rate of speed. A contributing cause of the accident was the driver's lack of training in the operation of the ambulance at high speeds. The National Transportation Safety Board recommended to the National Hwy. Traffic Safety Administration to provide for behind-the-wheel training in high-speed driving, requiring a student to complete successfully both a written and a behind-the-wheel examination before he is licensed; to urge the States to maintain and make available the records of all licensed emergency vehicle operators; to include ambulances and other emergency vehicles in Federal Motor Vehicle Safety Standards 220, 221, and 301; and to study the feasibility of extending FMVS Standards relating to vehicle interior padding, occupant protection, and anchorage of seats and equipment to include ambulances and other emergency vehicles. It was also recommended to the General Services Administration that Federal Specification KKK-A-1822 include maintenance of handling characteristics during modification procedures, loading instructions, body structural integrity anchorages for all equipment installed, and occupant protection. It was recommended to the National Committee on Uniform Traffic Laws and Ordinances that specific criteria be used to justify an exemption from posted speed limits, including consideration of the gravity of the patient's condition, condition of the vehicle, traffic and roadway, environmental conditions, certification of the ambulance driver, and restriction of the ambulance speed to no more than 10 mph over the posted speed limit.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-4 ; 1979 ; 28p 11refs
Availability: NTIS

HS-026 562

AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT

An analysis of the current North Carolina bicycle accident problem was conducted, to initiate a continuing program of accident data retrieval and analysis for the N.C. Bicycle Program, to update previous N.C. bicycle accident studies, and to examine the utility of other existing sources of enriched bicycle-related information. A special Hwy. Safety Res. Center (HSRC) RAPID data set was developed to provide quick access to bicycle accident data from 1974 through 1976, permitting regular data comparisons. The 1974-76 data were compared with previous data (1965-68) from an earlier HSRC study; two other classes of vehicles (motorcycles and passenger cars) were also compared with bicycles to determine differences in accident patterns. The HSRC Narrative Search System was utilized to extract over 800 crash descriptions of 1976 bicycle accidents taken from the N.C. traffic accident report form; these were analyzed for information not found on the standard report. Unfortunately, these were typically so brief that many variable items could not be coded. An analysis of the N.C. Board of Transportation Merged System, combining accident and roadway characteristics for the N.C. rural primary system, gave results about geometric variables not contained on the basic accident form. For these rural accidents, many bicycle crashes were in rural areas with partial or no development and on routes with 55 mph speed limits. Many bicycle accidents occur because of the motorist's difficulty in seeing the bicyclist and his vehicle; special equipment, such as a high-rise pennant or safety flag, and a strobe light, as well as reflective clothing worn by the rider, are recommended. Educational programs for both bicyclists and motorists are suggested. The narrative description in the accident report is a convenient section for officers to mention pre-crash factors and other information helpful to the study. Municipalities should pass and enforce ordinances dealing with hazardous bicycle riding techniques. Separation of bicyclists from motor vehicles should be arranged wherever practicable, although as a viable and relatively safe mode of transportation, the bicycle should not be overregualted or overburdened with requirements.

by William W. Hunter; David G. Cole; Elizabeth C. Leggett
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1978 ; 181p 5refs
Prepared in cooperation with the N.C. Dept. of Transportation Bicycle Program.
Availability: Corporate author

HS-026 563

U.S. TRANSPORTATION INCHES INTO METRIC

The steps in the process of U.S. conversion to the metric system are reviewed since the passage of the Metric Conversion Act in 1975. In spite of emphasis on voluntary conversion, there has been much opposition; a recent survey indicated that 69% of respondents opposed a national policy of mandatory metric conversion. The pharmaceutical industry was a leader in metric conversion, followed by the wine industry. Some automobiles have been manufactured under the metric system and auto repair shops have purchased metric tools. Multinational corporations are the most obvious beneficiaries of metric conversion, or "Systeme Internationale." Small firms are the most likely to lose by converting. Costs of metric conversion are estimated either as minuscule or enormous, depending upon the source of the estimate. Conversion is viewed as an opportunity for the food industry to standardize shipping containers by "modularizing." Metric conversion of hardware (thread and bolt sizes and component dimensions) is among the most difficult problems, and the strongest argument for such conversion is to make the U.S. products compatible with those of the rest of the industrial world. Government policy at present seems to be directed at leaving the initiative to those who will be most affected (i.e. industry, the states, and the public), although conversion deadlines from international transportation organizations may cause the Dept. of Transportation (DOT) to accelerate its conversion pace. Some DOT agencies are headed toward conversion; metric measurements are used in packaging and shipping hazardous material (Materials Transportation Bureau). Progres toward conversion by other agencies is briefly mentioned (Civi Aeronautics Bureau, Federal Maritime Commission, Interstat Commerce Commission). Separate sections provide a list o metric laws and practices in international trade, including a address for obtaining information about the laws in a particula country, and a brief discussion of the effect of metric conversion on packaging dimensions.

Publ: Traffic World v179 n1 p35-8, 40, 42-3 (2 Jul 1979)
1979 ; refs
Availability: See publication

HS-026 564

THE AMERICANIZATION OF THE SMALL CAR

The growing importance of the small car and its effect on the market is discussed by Automotive Marketing's Retail Panel. The combination of the older car population (more than 130 million pre-downsized registered vehicles) and the new lighter smaller cars will require a larger inventory of replacement parts and more expert service. Maintenance will be important, taking precedence over appearance. Problems in the new markets are considered to be, in order of importance: inventory control, 73%; government regulations, 57%; economic conditions, 46%; rapid market changes, 24%; and competition, 12%. (The figures represent percentage of responses to the question of the biggest problem in the present aftermarket.)

Publ: Automotive Marketing v8 n6 p50-1 (Jun 1979)
1979
At head of title: Headquarters Report.
Availability: See publication

HS-026 565

SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]

A field report sums up the feelings of store and service managers across the country on how the small car is influencing their business. Sales of tools and aftermarket items to do-it-yourselfers are increasing. Almost 2/3 of Automotive Marketing's Retail Panel says that more smaller cars will mean more service business for their bay operations. Problems connected with small foreign cars include possible sub-standard quality in emission controls, need for frequent front-end adjustments after driving on poor roads, complicated ignition systems, and difficulty in obtaining parts. New training and equipment is needed; few mechanics understand late model compacts of any kind. This condition should correct itself in a few more years, with the mechanic understanding the import compacts better, and the foreign manufacturer making a less complicated car.

by Pete Rigney
Publ: Automotive Marketing v8 n6 p46, 49 (Jun 1979)
1979
At head of title: Store Report.
Availability: See publication

HS-026 566

A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?

Human response to vibration is used as an example for consideration of the requirements of standards in the human factors field. The International Standard for general use (ISO 2631) attempts to give acceptable levels of vibration in terms of health, comfort and working efficiency; the important variables are amplitude and frequency of vibration and duration of daily exposure. Despite certain failings, the standard is an attempt to throw light on a complex environmental problem, and may have served to promote awareness by engineers of the need to consider human problems. The purpose of standardization is discussed and its original use in regulating the production of equipment and materials is differentiated from that of standards relating to people, which may be concerned primarily with the design of equipment for optimum satisfaction of users. A clear distinction should be made between standards intended to protect people from harmful conditions or minimize the risk of people being harmed, and those intended to give advice and information. In the case of human response to vibration, it is suggested that standards should relate to agreed methods of measurement and assessment, limitations to preserve health, limitations to be applied in specific situations in order to prevent the risk of accidents, and a data base for designers to work from.

by J. Sandover
Publ: Applied Ergonomics v10 n1 p33-7 (Mar 1979)
1979 ; 17refs
Availability: See publication

HS-026 567

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS

A comprehensive assessment was made of current needs in noise abatement technology, as well as a comprehensive review of current research, in order to present recommendations for research to fulfill unmet needs. Workshops were conducted in control of noise from machinery and construction, from surface transportation, and from aviation sources. The ability to design and develop new equipment and processes to meet reduced noise level requirements was found lacking. There was found to be a great deal of commonality of manufacturing processes and mechanisms, with potential for multiple solutions by noise abatement research. The principal sources of surface transportation noise were found to be, for the most part, common to all vehicles. Engine noise during conventional take-off and landing of aircraft is still the principal source of noise impact in the airport community. High priority was recommended for noise research efforts on diesel engines, tire and tire-roadway interactions, and on rail wheel and track interactions. Improved and validated component noise prediction methods were considered necessary in future research on airport noise reduction. The following recommendations were also made for the roles of government, universities, and industry in performing noise abatement research. The Federal government's efforts should be directed primarily toward basic research, especially long-term and high-risk research, as a basis for new technology, and toward support for demonstration programs carried out by industry; educational institutions should train personnel and perform basic research funded by government or industry; industry's efforts should be primarily directed toward implementation of noise control technology, and toward short-duration and low-risk technology applications for specific configurations.

Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C. 20460
Rept. No. EPA-550/9-79-311 ; 1979 ; 192p 5refs
Includes HS-026 568.
Availability: GPO

HS-026 568

KEYNOTE ADDRESS [TRAFFIC NOISE]

European methods of protection against noise caused by heavy traffic are reviewed. Among the approaches mentioned are methods of measuring and predicting noise levels (by formulae, by computer, or by scale model), construction of walls or earth banks, and insulation of building facades. Research in vehicle noise abatement at the source is described, principally by engine modification (moving parts, engine block, intake and exhaust, fan). The British Quiet Heavy Vehicle Project is described, and a list provided of some European centers working on vehicle and highway noise. Railway transport noise is briefly mentioned. It is concluded that a reduction of 5 dB is possible for passenger cars, and of 10 dB for heavy trucks.

by Claude Lamure
Institut de Recherche des Transports, Centre d'Evaluation et de Recherche des Nuisances, France
Publ: HS-026 567 (EPA-550/9-79-311), "Noise Technology Research Needs and the Relative Roles of the Federal Government and the Private Sector," Washington, D.C., 1979 pIII-21--III-49
1979
Presented at EPA Noise Technology Symposium, Dallas, 29-31 Jan 1979.
Availability: In HS-026 567

HS-026 596

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION

Energy consumption in passenger and freight transportation in Sweden has been analyzed in terms of propulsion, manufacture and maintenance of vehicles, and construction and maintenance of the infrastructure of traffic systems. Calculations are relevant to the mid-1970's and are representative of the energy content of crude oil as imported to Sweden. The following modes are compared: passenger transport (automobiles, buses, commuter trains, subways, aircraft), and freight (trucks, railway, and coastal shipping). It is concluded that all of the present modes have advantages according to the demands made on them, and the requirements for regular use, capacity, and available freight volume or passenger flow. Conclusions about the most energy-efficient mode must be limited to specific conditions. Efforts to find the most energy-efficient transportation approach should be directed towards achieving the right balance among the various modes, and not towards discovering the "most energy-efficient" mode.

by Ilja Kordi; Lars Schjelderup
Royal Inst. of Tech., Dept. of Hwy. Engineering, Stockholm, Sweden
Rept. No. TFD-1979:6 ; 1979 ; 106p 20refs
Sponsored by Transportforskningsdelegationen (TFD).
Availability: Transportforskningsdelegationen (TFD), Sveavagen 166, 14 tr, S-113 46 Stockholm, Sweden

HS-026 597

UNDERSTANDING ANTITRUST CHEMISTRY

In order to provide some insight into the function and effectiveness of the various types of proprietary compounds available for rust prevention or retardation, an explanation is given of how rust forms and what is required to stop the process. The electrochemistry of rusting (or corrosion) is explained and illustrated, followed by descriptions of the rust fighters. Petroleum and solvent-based rust preventives, applied as coatings to the metal surface, form a protective film. Rust inhibitors produce a chemical reaction which protects the metal surface. The three types of inhibitors are passivators (their mechanism not entirely understood); organic inhibitors, which form an adsorbed layer on metal surfaces; and vapor-phase inhibitors, similar to organic inhibitors except that they vaporize at ambient temperatures to form a thin, ionic film. Many paints and primers contain rust inhibitors; when properly applied beginning with metal pretreatment, they provide adequate rust prevention. Individual sections discuss recently developed (U.S.) rust-proofing systems (coatings) that resist heat welding during automobile manufacture, and a paste-like coating manufactured in the Netherlands which can be used for corrosion prevention of painted automotive surfaces. The layers of rust inhibiting materials used in a typical car body are illustrated.

by David T. Curry
Publ: Machine Design v51 n16 p58-63 (12 Jul 1979)
1979
Availability: See publication

HS-026 598

WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]

General Motors' new front-wheel drive X-car (compact) successfully combines traditional American-car qualities (i.e. comfort, roominess, and performance) with the European and Japanese car virtues of efficiency and agility. The X-car's development took more than four years and cost almost $2.7 billion. The development evolved about a project center concept, which involved forming an engineering group composed of experts in design, manufacturing, assembly, customer service, and marketing. By eliminating redundant work by the different divisions, the center strives to keep manufacturing costs down and, at the same time, helps the divisions strengthen their separate identities. X-car models (e.g. Chevrolet Citation, Oldsmobile Omega) have more parts in common than any earlier GM lines, but divisional variations are more substantial than heretofore. Engineering both commonality and diversity into its cars reflects GM'S attention to tradeoffs between volume manufacturing efficiency and the varying demands of the marketplace. Examples of engineering innovations to increase reliability and longevity are transverse-mounted engines (reduced vibration), bolted rather than welded fenders (easier replaceability), and heavy-duty clutches in manual transmissions. With the X-car, GM has made the best use of its resources to position itself for a global challenge.

by Charles G. Burck
Publ: Fortune v99 n9 p124-8, 132, 134, 136 (7 May 1979)
1979 ; 3refs
Availability: See publication

HS-026 599

EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE

The exotic car is a test bed for new ideas that major manufacturers cannot afford to offer on a mass production basis. Th exotic-car makers have pioneered the use of safety equipment often developed from race-car experience. They have been leaders in lightweight materials, have explored means of obtainin higher power from smaller engines, and have used aerodynamics to achieve high-speed stability and fuel economy. Radia tires first appeared as standard equipment on exotic cars. Thes technological achievements are not enough; exotic-car maker must operate under the same constraints of government-impose air pollution, fuel economy, and safety standards as all auto makers. Porsche and Jaguar, with relatively large volumes, hav comfortably survived regulation. For the mostly diminutive independents whose products are largely hand-crafted, the enormous research, development, and tooling costs required to mee rigid government standards have led to retrenchment or demise Only four of the smaller exotic-car makers are left to compet (Ferrari and Maserati in Italy, and Aston Martin Lagonda an Lotus in the U.K.). These companies continue to build cars fo the U.S. market because they could not expand sales elsewher to make up the loss and they regard U.S. regulations as precursors of what will exist in other countries.

by Peter Bohr
Publ: Fortune v99 n11 p114-9 (4 Jun 1979)
1979
Availability: See publication

HS-026 600

AUTO REPAIR: PROBING THE DEPTHS

Apart from workmanship, time spent on the job, and qualities o material in repair, factors which account for the expense of aut repair include pressure for back-end profits, incentives to replace instead of repair, increasing competition in the structure o the repair industry, and consumer ignorance. Two determinations must be made by the car owner before having work done on his vehicle: what are the symptoms and where to take the car for repair. To avoid automobile repair fraud, a list of symptoms must be written by the car owner on the repair order, and a written estimate received and signed by him. If the car is still under warranty, or just out, it should be serviced by the dealer. In other cases, consideration should be given to a chain/department store/tire dealer offering full service. If a repair matter goes into dispute, it could be referred to a dealer arbitration board or the Better Business Bureaus third-party arbitration program. Probably the best private sector repair program is the American Automobile Assoc.'s (AAA) Authorized Repair Service, where AAA is the final arbiter in any repair dispute. Other recourse is on the state or local level. California has the best auto repair laws in the U.S.; Maryland is active in consumer protection, especially in terms of the repair industry. In other states there are laws regarding auto repair which are not particularly progressive nor assiduously enforced. The AAA offers the following recommendations for the consumer: do not hurry; get a second opinion if the problem seems less urgent than the garageman implies; do not authorize a major repair job at the mechanic's recommendation without being sure of the real need; and in case of dispute, do not panic.

by Leon Mandel
Publ: Motor Trend v31 n8 p94-6, 98-102 (Aug 1979)
1979 ; 1ref
Availability: See publication

HS-026 601

VIOLENCE ON THE HIGHWAY

Across the U.S. traffic-related altercations are increasingly of a violent nature. Some incidents involve the cars as weapons; others involve fights between drivers. Rapid growth in traffic volume has been cited as a possible factor in aggravating driver violence. The FBI says tha one of the most dangerous things a police officer does is to interview a traffic violator. A psychiatric description of a violent driver is one who is tightly in control of his emotions and who has few outlets for expressing them. When he is driving a powerful car and gets into a frustrating situation or considers himself threatened by another driver, his emotions are expressed in a violent form. Many drivers may view their cars as reflections of themselves; when the car is threatened, the driver may feel personally attacked and respond with violence. It is felt that anyone is subject to this type of reaction, depending on the circumstances. Whatever the reason for a violent outburst, authorities caution that an angry response can only make matters worse. If involved in an accident, the best approach is to keep quiet if the other driver becomes overly argumentative. If the other driver threatens physical violence, it is advised to leave the scene and to call the police immediately to report the accident. If the car cannot be driven away, the advice is to get in the car, lock the door, and wait for the police. The objective is to avoid contact under all circumstances.

by Jan Bowers
Publ: Traffic Safety v79 n7 p14-5, 29-30 (Jul 1979)
1979
Availability: See publication

HS-026 602

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT

The yellow highway paint in current use is often not as visible as white paint under adverse lighting and weather conditions. It has lower initial brightness, darkens more rapidly with exposure, and contains lead pigment (lead chromate) which is more toxic and more expensive than white pigment (titanium dioxide). This study showed that up to 50% (by weight) of the lead pigment can be replaced by white pigment without losing yellow color identity under lighting and weather conditions where 100% yellow color is normally distinguishable. This maximum dilution which still permits reliable identification of yellow was determined by means of color judgments made by 20 subjects observing a series of paint mixture sample strips (8 ft x 4 in) from the driver's seat of a parked car at distances of 30 ft, 60 ft, and 90 ft, under both day and night lighting conditions. A cost savings of more than $1 million could be realized annually in the U.S. by diluting yellow paint with white paint so that a 50:50 pigment weight ratio is obtained. This results in very little color change, providing improved visibility, reduced darkening with age, and reduced toxicity. No change in equipment or procedures is required, and existing stocks of yellow paint can be used by dilution with white paint.

by John O. Merritt; Salena K. Kerr
Systems Technology, Inc., Hawthorne, Calif.; Human Factors Res., Inc., 6780 Cortona Drive, Goleta, Calif. 93017
DOT-FH-11-8824
Rept. No. FHWA-RD-77-166; STI-TR-1065-1-II; HFR-1769-1; PB-290 483 ; 1977 ; 62p 7refs
Vol. 1 is HS-023 852.
Availability: NTIS $5.25

HS-026 603

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER

Results are reported of an exhaust emission testing program in which 24 relatively new vehicles sampled in a Restorative Maintenance Program in Denver were retested approximately one year later. The vehicles were 1977 model year passenger cars certified for sale at high altitude; Chrysler, Ford, and General Motors vehicles were equally represented. Representatives of the three automakers assisted in the inspection and maintenance activities; testing was conducted by Automotive Testing Labs., Inc. Average hydrocarbon and carbon monoxide levels from vehicles which were tuned-up earlier had degraded to a point slightly worse than their original levels in as-received condition. The average nitrogen oxides level had also increased but not quite past the original value. Many vehicles had experienced maladjustment and disablements, although the owner reported that he felt his vehicle had been maintained according to the manufacturer's recommendations. The most frequent maladjustment was idle mixture, followed by ignition timing, choke settings, and disabled exhaust gas recirculation systems. Reductions in average emission levels followed the correction of the maladjustment and disablement actions to a point close to those after the prior tune-up. Modest fuel economy improvements were noted this year, probably due to the fact that the vehicles had now overcome the "green engine" effect.

by Gary T. Jones
Environmental Protection Agency, Emission Control Technology Div.
Rept. No. EPA-TR-79-3; PB-290 666 ; 1978 ; 38p 1ref
Availability: NTIS $4.50

HS-026 604

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY

A 12-month survey of licensed drivers (May 1978-Apr 1979) is underway by the Road Safety Branch of Transport Canada to obtain a nationally-representative estimate of the number of miles driven by Canadian motorists. The sample of 9000 drivers being interviewed comprises residents of all the Canadian provinces except the Yukon Territory and the Northwest Territories. Driver and vehicle information is being solicited; in addition to being interviewed, the participants in the survey maintain a one-week "trip diary". Following an overview of the concept of exposure (to the risk of an accident), including the uses and needs of this type of data and a formal definition, a nonexhaustive review of the literature on exposure research is presented. The central focus is to describe the methodology which has been developed for the data collection effort. Topics include survey populations, sample design, dependent and independent variables, survey instruments, and interviewing protocol. The results of a pilot test conducted in Mar 1978 are also provided; they indicated that the methodology is both feasible and realistic, although several minor changes were incorporated into the final study design.

by James Rochon; Larry Swain; Susan O'Hara
Transport Canada, Road and Motor Vehicle Traffic Safety Branch, Ottawa, Ont., Canada; Statistics Canada, Information Bank Methodology Section, Ottawa, Ont., Canada; Canadian Facts Ltd., Toronto, Ont., Canada
Rept. No. CR-1102; TP-1970 ; 1978 ; 157p 28refs
Availability: Transport Canada, Road and Motor Vehicle Traffic Safety Branch, Ottawa, Ont., Canada

HS-026 605

HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT

A concept is introduced of explicitly incorporating the role of individual drivers as independent decision-makers in optimization of traffic control by the traffic authority. The Hybrid Optimization Problem (HOP) formulation provides a general theoretical framework for the study of this class of traffic control problems. In traffic engineering, the problems of system optimization, control optimization, and assignment have been studied independently of one another. The formulation of the HOP can be viewed as a unified approach which combines these problems in transportation systems. Different behavioral models for flow distribution are examined, necessary conditions for the optimal solution of the HOP are derived, and a physical interpretation of these conditions is provided. Possible directions are proposed for the development of algorithms applicable for solving large-scale HOP'S, and a procedure outlined for computing the upper and lower bounds of HOP optimal cost.

by Han-Ngee Tan; Stanley B. Gershwin; Michael Athans
Massachusetts Inst. of Tech., Lab. for Information and Decision Systems, Cambridge, Mass. 02139
DOT-TSC-1456
Rept. No. DOT-TSC-RSPA-79-7 ; 1979 ; 123p 69refs
Rept. for 13 Mar 1978-14 Mar 1979.
Availability: NTIS

HS-026 606

KEEP 55 ALIVE [NATIONAL SPEED LIMIT]

A National Safety Council study shows that there was a 15% decrease in fatality rates in urban areas from 1973 (when the 55 mph national speed limit was first proposed) to 1977, and a 23% decrease in rural areas, based on deaths per 100 million vehicle miles. Using the 1973 experience and accounting for increased miles traveled, 62,100 fatalities were predicted for 1977; the actual deaths in 1977 numbered 49,500. Reduced speeds accounted for 44% of the 12,600 net lives saved. A similar study in 1974 by the Council estimated that half of the reduction in deaths could be attributed to reduced speeds. It is known that the possibility of death or serious injury increases with speed. Although the number of miles driven has increased, the rate of deaths per miles driven has decreased by 19% since the 55 mph speed limit became law. The national speed limit has reduced driving speeds in general, and can be given credit for energy conservation. The 55 mph speed limit is a lifesaver, and its retention and increased enforcement offer the best means of combating the current upsurge of fatalities. In order to achieve proper enforcement, the states are entitled to more Federal money outside of Section 402 (Highway Safety Act) funds. The Federal government should also provide greater support to driver improvement programs. The states must make a firm commitment to support and enforce the 55 mph limit, and the individual motorist must do his part by complying with the law.

by Vincent L. Tofany
Publ: Traffic Safety v79 n7 p18-20, 29 (Jul 1979)
1979
Adapted from a speech presented by Mr. Tofany at National Speed Limit Conference, Baltimore, 22-24 May 1979.
Availability: See publication

HS-026 607

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)

Research begun in 1973 was designed to assess an instrumental measurement method for diesel exhaust odor which was developed under CRC-APRAC sponsorship by Arthur D. Little, Inc. A wide variation in results from initial analysis of common samples using the Diesel Odor Analysis System was attributed mainly to lack of experience by participating laboratories. Three additional cooperative studies were subsequently conducted which evaluated individual procedural steps in sample extraction, injection, and instrument operation. A final cooperative study, serving as a review of each analysis step, showed that the analysis of common derived odorant samples could be measured within 0.3 Total Intensity of Aroma units by nine participating labs, a level of variability considered acceptable. Three participants investigated sampling system design and operating parameters through in-house studies. This work coupled with the analytical work led to a tentative recommended technique for measuring diesel exhaust odor intensity. Further work is recommended, including a cooperative study where collection systems are assembled at one site to collect samples from a common source, and a panel-instrument correlation study to reassess the relationship between Liquid Chromatography Oxygenate concentrations and human response to diesel odor intensity. Several nonparticipating labs have reported data suggesting a review of the efficiency of collection of current trap designs as a function of sample flow rate and trap temperature.

Coordinating Res. Council, Inc., Odor Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
Rept. No. CRC-507 ; 1979 ; 85p 12refs
Availability: Corporate author

HS-026 608

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978

A four-year research effort was designed to develop an engine test procedure for evaluating the ability of gasolines to minimize deposits on the intake valves, ports, and runners, and quick-heat manifolds of gasoline engines. The initial procedure evaluated in 27 tests on the specified test fuel by 12 laboratories proved to be too mild in terms of intake valve deposit buildup. Variability among labs appeared to be unsatisfactory because of the lack of an acceptable rating procedure. Rating workshops were subsequently initiated, and a recommended rating procedure was submitted. These early results prompted an extension of the program to evaluate the effects of changes in engine and cycle parameters on test severity. Another series of 27 tests was conducted by ten labs. Results from this study led to development of the current dynamometer procedure which increased average intake valve deposits from 1.7 g/valve to 2.4 g/valve per test. To appreciate these levels of deposit weights, a study indicated that average intake valve tulip deposits ranged from 0.09 g/valve to 9.5 g/valve with 2 g/valve to 4 g/valve being common. It is believed that 2 g/valve in the 350 cu-in-displacement engine does not appreciably affect engine performance. Additional work is underway in an attempt to decrease test variability. The proposed "Induction System Rating Procedure," recommended for adoption as a Coordinating Res. Council procedure, is appended. Future testing is recommended with consideration to smaller engines, increased load factors, and possibly turbocharging, to reflect current trends.

Coordinating Res. Council, Inc., Intake Manifold Deposit Engine Dynamometer Test Procedure Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
Rept. No. CRC-505 ; 1979 ; 144p
Availability: Corporate author

HS-026 609

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT

A technical information search was conducted on the subject of fuel economy improvement by use of friction-reducing lubricants. A literature search and interviews with technical personnel of 30 organizations involved or knowledgeable in the subject area were conducted. Based on the results of this survey, it is concluded that a significant fuel economy benefit can be obtained through the use of friction modifiers, and reduced-viscosity engine oils and rear axle lubricants. Friction modifiers are classifed in two categories: oil soluble chemicals or solid lubricants, such as graphite, in colloidal suspension; and "slippery" metals such as various forms of molybdenum, also in suspension. Additional improvements can probably be expected in the future. Current laboratory engine tests do not show the same fuel economy differences as the field results obtained to date. A customer survey program is recommended to document the benefit of friction-reducing oils in customer service, this information to serve as a data base for further laboratory test development. Sponsorship should be sought for a laboratory engine program which will map specific engine friction losses under actual engine operation conditions. A cooperative effort should be established to develop a suitable laboratory research technique for predicting the fuel-efficient capabilities of prospective oil candidates.

by E. F. Marshall
Coordinating Res. Council, Inc., Fuel Efficient Lubricants Group, 30 Rockefeller Plaza, New York, N.Y. 10020
DAAK70-78-C-0102
Rept. No. CRC-502 ; 1978 ; 78p 99refs
Availability: Corporate author

HS-026 610

DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS

During the period 1967 to 1977, research was conducted to develop a test method for laboratory estimation of the thermal oxidation stability of automotive gear oils. The results of cooperative testing of a series of samples with refinements of a test method originally devised by the Army Fuels and Lubricants Lab. (Thermal Oxidation Stability Test) are presented. Several laboratories also tried to duplicate the evaluations in glassware equipment, but the results and the availability of necessary apparatus suggested that the best approach was to use the apparatus developed by the Army. A final version of the test technique (CRC-L-60-78), which gives satisfactory repeatability and reproducibility, is appended.

Coordinating Res. Council, Inc., Thermal Oxidation Test Techniques Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
Rept. No. CRC-501 ; 1978 ; 47p 2refs
Availability: Corporate author

HS-026 611

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]

The octane number requirement (ONR) was determined for each of 120 1977 model U.S. cars (20 cars each of 6 models) at an altitude of 5280 ft, and 24 of these cars (4 cars of each model) were then transported to sea level for ONR testing. Requirements were measured on Primary Reference fuels and two Full-Boiling Range Unleaded Reference fuels in order to determine the impact of altitude exhaust emission standards on ONR'S of altitude-calibrated cars, and to determine if the former relationship of altitude increase to decrease in ONR has changed. The evaluated data indicates that the changes made in altitude-calibrated cars to meet high-altitude emission standards do not significantly affect ONR'S at sea level when compared to sea-level cars tested at sea level. The relative rate of drop in ONR'S with increasing altitude may have decreased slightly for the 1977 model year cars as compared with 1971 and 1972 models, but the rate of drop is similar to that reported for 1967-1970 model cars and should not be considered as a major change. The detailed test program is appended.

Coordinating Res. Council, Inc., 1977 Altitude Prog. Analysis Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
Rept. No. CRC-500 ; 1979 ; 107p 6refs
Availability: Corporate author

HS-026 612

A METHOD OF SAVING MONEY [CAR-POOLING]

In view of the new Transport Act in Britain which legalizes the carrying of paying passengers by private car owners on work or other nonprofit-making trips, and the agreement by insurance companies to relax their definitions of "carriage for hire or reward," the benefits to be derived from establishing car-sharing schemes are enumerated. Benefits to the employer include a reduced demand for parking facilities, access to larger labor market, and improved public image. Benefits to the participating employees include saving in gasoline costs for those who previously drove alone, and increased comfort and reduced cost for former mass transit users. Local and national benefits include reduced peak hour congestion on roads and on public transport, more effective use of existing roadspace and parking space, reduced fuel consumption, less pollution, and more efficient use of the public transport infrastructure. The Inst. of Transport Studies, which will administer ride-sharing schemes in large centers of employment in Britain during 1979, will benefit by obtaining data on the operation of such schemes. The main participant incentives, which are necessary for car-sharing success as experienced in the U.S. and elsewhere, are outlined and discussed. These include provision of information to workers whose schedules are compatible, legality of accepting contributions for fuel costs, freedom to use flexitime, and preferential treatment in parking areas and on the roads.

by Peter W. Bonsall
Publ: On the Road v2 n2 p4-6 (Summer 1979)
1979
Availability: See publication

HS-026 613

THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]

Paradoxically, in an age of built-in obsolescence, repair work to accident-damaged vehicles is being carried out on a more extensive scale than ever before. The advance in repair techniques makes it comparatively easy today to restore car bodies that would once have been consigned to the scrap heap. Normal practice today is to mount the damaged body on a measuring jig, then to pull the damaged metal sections back into shape using hydraulic pulling equipment. The most damaged panels are replaced with new ones. An important part of the restoration technique is to pull the distorted sections back to shape in reverse order to the sequence in which they were damaged: the four suspension mountings are restored to their correct horizontal and vertical positions, the wheel geometry can then be corrected, and everything else follows. Important developments which have led to reduced repair costs include part panels, MIG welding (can be carried out from one side only and without trim removal), and paint that can be cured at any temperature. A much higher potential of repairability exists in the U.K. than ever before, and repairs can usually be carried out at extremely competitive prices. The trend is now a return to small, independent firm vs. franchises in doing body repair work, as well as more extensive repairing vs. unit replacement. The repair industry will be formed around specialists who conform to the code of practice as drawn up by the Vehicle Builders and Repairers Assoc. in conjunction with the Office of Fair Trading.

by A. L. Sunderland
Publ: On The Road v2 n2 p8-10 (Summer 1979)
1979
Availability: See publication

HS-026 614

PROPANE: LOGICAL GAS ALTERNATIVE?

Information is provided to help the recreational vehicle (RV) owner make an intelligent decision on whether to convert to propane fuel or dual-fuel (gasoline/propane) use. Test results for a new Itasca mini motorhome (Winnebago) with dual-fuel capability illustrate that the use of propane vs. gasoline does reduce fuel economy and performance. The price differential between propane and gasoline currently makes the fuel economy penalty seem almost insignificant. Propane prices will undoubtedly increase, but its supply outlook is favorable compared to gasoline. Whether or not propane is practical depends primarily on its availability and price in the areas where the motor-home owner usually travels. If the decision is made to convert to propane, the choice then must be made between dual- vs. single-fuel, one of the critical factors being tank size. An RV operating on propane must have enough capacity to avoid running out of fuel. The required amount depends on individual travel habits and availability in specific areas. A single-fuel system is not practical with less than 70 or 80 gal. of propane. Single-fuel setups do have the advantage of slightly improved fuel economy and performance. With propane use, operating temperatures must be lower; adjustments must be made to the engine coolant thermostats and fans with fluid-drive clutches. Some minor work is also required on the ignition system, and addition of cool-air induction to the air cleaner is necessary. Safety is not a problem with propane use if RV owners follow basic safety procedures. The prospective propane conversion buyer must weigh the liabilities of propane use against the advantages for his own situation.

by Bill Estes
Publ: Trailer Life v39 n9 p84-8, 93-7 (Sep 1979)
1979 ; 1ref
Availability: See publication

HS-026 615

THE ROLE OF DRIVERS' VISION IN ROAD SAFETY

The literature is reviewed on the relationships between driver's vision and driving performance, and some recent progress and anticipated developments are described which give promise of filling some of the gaps in the present state of knowledge. A weak but statistically significant positive association exists between driving performance (including accident record) and the following vision tests: dynamic acuity, angular movement detection, detection of movement in depth, and to a lesser extent, static visual acuity; significant associations have not often been found for younger drivers (particularly in the case of static acuity). The practical value for driver licensing purposes of all of these associations is low; vision tests are found to be poor predictors of accidents to individual drivers. Statistically significant associations have not been generally found for a number of vision tests, including those of color vision, stereoscopic acuity, ocular muscle imbalance, and visual fields, but exceptions to this generalization may occur in specific circumstances. Further evidence is required before an assessment can be made of the relevance of night vision tests and of monocularity to driving performance. Strong positive associations between driving performance and both kinetic visual acuity and cross-dominance need to be studied further. A new rapid test of contrast sensitivity function is being evaluated in terms of driver accident record.

by P. A. Davison
Publ: Lighting Research and Technology v10 n3 p125-39 (1978)
1978 ; 93refs
Presented at meeting of Lighting Div. 8 Mar 1978. Includes comments from meeting participants and author's replies.
Availability: See publication

HS-026 616

TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]

In a continuing study of vehicle speeds on Indiana highways, spot-speed observations were made of automobiles and trucks on rural Interstate, four-lane, and two-lane highways and on urban Interstate highways throughout the state during the Jan-Mar 1979 quarter. Results indicate that the average speed for all vehicles is relatively unchanged from the previous quarter. The overall average speed for passenger cars and all trucks was 58.3 mph and 57.4 mph, respectively. These speeds were 0.5 mph and 0.2 mph less, respectively, for passenger cars and trucks than speeds found in the Oct-Dec 1978 quarter.

by R. P. Guenthner; G. K. Stafford
Purdue Univ., Joint Hwy. Res. Proj., West Lafayette, Ind. 47907
HPR-1(16)-PART-I
Rept. No. JHRP-79-4: PR-108 ; 1979 ; 49p
Conducted in cooperation with Indiana State Hwy. Commission, and Federal Hwy. Administration.
Availability: NTIS

HS-026 617

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT

A computer simulation model was developed to analyze and estimate the complex interactions among the critical factors influencing state highway financing, with their impact on highway performance. The model, designed to enable legislators to make informed decisions on highway financing, was extensively tested and applied to the Indiana situation. The model utilized the national energy and economic forecasts developed by Data Resources Inc. along with various assumptions regarding legislative options to project a probable range of Indiana highway performance. Results indicate that an overall deterioration in highway performance can be expected to continue in Indiana because of the enormous funds required to stabilize or improve such performance. The extent of future deterioration can be regulated by new taxing policies, revised highway performance criteria, and governmental promotion of carpooling, mass transit, and other factors that may effectively reduce future highway congestion. Options considered in this study revealed that although a general decline in highway performance can be expected, appropriate highway policy decisions can assure the sustenance of a tolerable level of highway performance well into the future.

by Fred Laires Mannering
Purdue Univ., Joint Hwy. Res. Proj., West Lafayette, Ind. 47907
Rept. No. JHRP-79-6 ; 1979 ; 212p 39refs
Prepared in cooperation with Indiana State Hwy. Commission.
Availability: Corporate author

HS-026 618

A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT

This research developed a multidisciplinary team approach to investigate high-accident locations in order to identify the predominant accident types and causal factors, and to suggest possible countermeasures. Four teams were organized, each consisting of an Indiana State Hwy. Commission (ISHC) central office traffic engineer, an ISHC district traffic engineer, a local traffic engineer, a human factors person, and a law enforcement officer. The data required for a team field investigation of 18 high-accident sites were developed. A manual was developed that briefly describes the goals of the multidisciplinary team investigation, prescribes the necessary professional disciplines, and outlines a procedure for field investigation. Each member individually drives all approaches to the site, reviews the data packages supplied, identifies the accident types and causal factors, and suggests possible countermeasures. After all five members return their evaluation forms and the team leader has summarized the results, the team may meet to discuss the results and reach a consensus, or the team leader may make the final determination. The multidisciplinary team approach proved to be effective in developing possible measures to improve high-accident locations in Indiana. An annotated bibliography is included.

by James R. Ogren
Purdue Univ., Joint Hwy. Res. Proj., West Lafayette, Ind. 47907
HPR-1(15)-PART-II
Rept. No. JHRP-78-18 ; 1978 ; 159p 37refs
Conducted in cooperation with Indiana State Hwy. Commission, and Federal Hwy. Administration.
Availability: NTIS

HS-026 619

MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS

Nationally, since the early 1970's when the majority of states lowered their legal drinking age, there has been a 28% increase in the number of alcohol-related traffic accidents involving the under-20 driver, according to a Dept. of Transportation survey. The involvement of drinking teenagers in traffic accidents or fatalities before and after lowering the drinking age is compared in various states: in Arizona, involvement in fatal accidents doubled in 1975 over 1971; in Illinois, there was a 33% increase in traffic accident involvement in 1977 over 1973; in Connecticut, involvement in traffic accidents increased from 13% to 24% in 1975 over 1972; in Iowa, there was an immediate increase in youth fatalities in 1973; and in Michigan, there was a 119% increase in accidents involving drinking teenagers in the three years following lowering of the drinking age. Results of a recent survey of high school students conducted by the National Hwy. Traffic Safety Administration demonstrate the extent of the teenage drinking problem. By their senior year of high school, 93% of males, and 87% of females have experimented with alcohol. Half of all those in high school drink at least once a week. Forty percent report that they have at least four drinks in any one day during a given week. Half of the licensed drivers say they have driven drunk at least once; 67% feel they can drink five beers in a two-hour period and still remain within the legal limit; 28% believe they drive as well or better under the influence of alcohol. These statistics have resulted in a trend toward increasing the legal drinking age in many states in which it was recently lowered.

by Charles Yoakum
Publ: Traffic Safety v79 n7 p17, 31 (Jul 1979)
1979
Availability: See publication

HS-026 620

THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN

Dr. John W. Melvin, of the Univ. of Michigan's Hwy. Safety Res. Inst. (HSRI), provides answers to questions on child restraints. The present Federal Motor Vehicle Safety Standard 213, which requires only a static test of child seats, is limited in establishing some structural deficiencies in child restraints. The standard is not totally inadequate in that it has eliminated child seats that were merely seats, and it is now being revised to include dynamic testing. It is hoped that this new standard will not eliminate seats that have proven effective in the field. The key factors in child restraint design are control of child's motion to prevent contact with vehicle interior, provision of a secure anchorage, and durability to withstand a crash. Most child restraint systems rely on the adult belt systems as their main source for attachment to the vehicle. Only 10% to 15% of children four years of age or younger presently use some form of child restraint. A one-year field study by HSRI showed the benefits of a child being restrained in terms of reduced number of contact points and incidence of contacts. The great majority of children under age 10 are not restrained in cars by either child or adult restraints. A lack of understanding of the seriousness of even minor collisions for unrestrained children, the poor human-factors design of restraints, and the costliness of some restraints are the main reasons for parents' failure to use child restraints. Pediatricians and the Federal government are becoming active in public education programs. Some of the mandatory child restraint use legislation now being proposed by some states is inadequate because of lack of information. The overall picture is that there is a low rate of child restraint use, some poorly designed restraints are in use, and some well-designed ones are not being used properly.

Publ: Traffic Safety v79 n7 p8-11, 28-9 (Jul 1979)
1979
Reprinted from a recent issue of HSRI Research Review.
Availability: See publication above

HS-026 621

CLAYBROOK RESPONDS TO THE AIR BAG CRITICS

Excerpts are presented from a letter by Joan Claybrook, head of the National Hwy. Traffic Safety Administration (NHTSA), addressing concerns about air bags expressed by a few members of the House Commerce Com. NHTSA has a detailed air bag evaluation program under development as recommended by the National Transportation Board. NHTSA believes that the manufacturers, as required by design standards, have acted responsibly in fully exploring the ramifications of the use of sodium azide as a propellant for air bag systems. Since air bags are effective only in frontal collisions, they cannot be expected to offer an overall remedy. Restraint systems of any kind are minimal in side collisions; the structure and energy-absorbing materials used in the door area are the critical factors. Reports from 600 million miles of travel in cars equipped with air bags have shown the passive restraints to be highly reliable. Air bags add little weight to an automobile, particularly in comparison with many common vehicle options. The added weight of the air bags will increase fuel use by a small amount (less than 5 gal/yr/average car), but this expense will be more than offset by reduced insurance premiums and medical costs in case of crash involvement. It is not feasible to return to the "Coleman plan" for occupant restraints. Although the Dept. of Transportation's policy is to strongly encourage the use of conventional, active belts, NHTSA believes that the only feasible way of providing occupant crash protection for the majority of motorists is by automatic systems.

Publ: Status Report v14 n11 p9-11,13 (Jul 1979)
1979 ; 1ref
Availability: See publication

HS-026 622

ENGINES AND CYCLES AIM FOR EFFICIENCY

The Dept. of Energy (DOE) awarded $57 million in grants in 1978 for development of more efficient engines and drives. Mechanical Technology, Inc., (MTI) of Latham, N.Y. has a contract to manage the program to develop an automotive Stirling engine. United Stirling of Sweden will develop and supply the engines, and AM General (subsidiary of American Motors Corp.) will be responsible for integrating the engine into U.S. vehicles. The plan is to raise the power of the baseline engine to 135 hp and efficiency to 39% by increasing peak operating temperature to 820 degrees C. The Brayton cycle gas turbine is being developed under extensive DOE grants, but many problems must be resolved before the gas turbine can compete in efficiency with conventional Otto and Diesel engines. Aircraft gas turbine design changes proposed by General Electric and Pratt and Whitney, and supported by DOE, are expected to result in an overall engine efficiency increase of 12%. Fuel injection and stratified-charge combustion engines have received no attention by DOE, although the end of the conventional gasoline engine is not in sight. Automotive companies are doing a lot of piecemeal development, but only to meet specific efficiency and emission standards. Thermo Electron Corp. (Waltham, Mass.) under DOE sponsorship, is working on the so-called bottoming-cycle diesel which promises 15% better peak efficiency. An alternative to the gas turbine is an open Brayton cycle with a reciprocating compressor and reciprocating power unit, rather than rotating elements; Glenn Warren (the Warren engine) has completed theoretical studies at MTI. DOE plans more development of the hybrid engine/electric vehicle in the future; most research today is aimed at developing batteries and electric drives that are self-sufficient for local and some extended travel. Two DOE-sponsored programs, other than those for engines, involve thermal storage media and hydraulic-mechanical split drives (Thermo Electron Corp. and Orshansky Drives Inc., respectively).

by Frank Yeaple
Publ: Product Engineering v50 n1 p35-8 (Jan 1979)
1979 ; 5refs
Availability: See publication

HS-026 623

AN AUTOMOBILE NOISE ANNOYANCE PROBLEM

In response to inquiries by an automobile manufacturer who received an unusual number of complaints about noise in the drivetrain, a sequential approach was taken to differentiate among possible noise sources and their general degree of importance. Preliminary engine tests were made to discover the identity of primary noise signals and the particular units of the drivetrain responsible. After identifying the differential assembly as the origin of the annoyance, subjective and objective quantification of noise and identification of noise-radiating components and development of "fixes" (noise reduction) were pursued. Respective fixes were subjected to quantification. As few as three trained observers could make adequate subjective evaluations of product noise acceptance. The perceived and measured noise levels originating with the differential gears were a function of the gear loading (vehicle acceleration rate); it was therefore essential to achieve repeatable gear loading during testing. Major noise control means were as follows: heavy mass loading and surface damping of propeller shaft, moderate vibration damping of propeller shaft, careful placement of drive pinions relative to ring gear and proper compression of pinion shaft bearings, and careful assembly of rear suspension system to assure that vibration isolators are correctly installed and loaded to achieve design specifications. The net result was a marked decrease in customer complaints. The cost of additional materials and labor was less than 1 cent/car and less than 20 cents/car, respectively. Added to these were the costs of reliability checking and limited rejections. Ultimately, customer satisfaction achieved was gratifying in both competitive and economic terms.

by John C. Johnson
Publ: Noise Control Engineering v12 n1 p26-30 (Jan-Feb 1979)
1979 ; 7refs
Submitted as partial fulfillment of INCE membership requirements.
Availability: See publication

HS-026 624

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978

Testimony and material submitted for the record are presented from two separate congressional hearings on safety belt usage, one held in San Juan, Puerto Rico (the only U.S. jurisdiction to enact mandatory seat belt use legislation) and the other in Washington, D.C. Government officials, private citizens, law enforcement personnel, and representatives from public interest groups, highway safety research institutions, auto clubs, the automotive industry, the insurance industry, and the medical profession testified and/or submitted material. Submitted material includes articles, tables, charts, graphs, letters, fact sheets, biographical sketches, news releases, prepared statements, and a section of the "Federal Register" (16 Dec 1976) on proposed rulemaking concerning improvement of seat belt assemblies.

Congress. House Com. on Public Works and Transportation
Rept. No. 95-39 ; 1978 ; 505p refs
95th Congress, 2d Sess.
Availability: GPO

HS-026 625

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977

Testimony and additional articles, letters, and statements are presented from congressional hearings on the Dept. of Transportation's motor vehicle safety rule proposed 30 Jun, 1977 which would require that automatic occupant crash protection devices be phased into the front seat positions of all new cars during model years 1982 through 1984. Air cushion restraints and passive seat belts are the primary automatic restraints in question. Government officials, private citizens, and representatives from public interest groups, highway safety research institutions, auto clubs, the automotive industry, the insurance industry, and the medical profession testified and/or submitted material.

Congress. Senate Com. on Commerce, Science, and Transportation
Rept. No. 95-126 ; 1977 ; 546p refs
95th Congress, 1st Sess.
Availability: GPO

HS-026 626

IOWA MOTORCYCLE CRASH STUDY 1974-1976

As part of a continuous study of motorcycle crashes in Iowa (with updates every three years), statistical data are provided for the period 1974-1976. Iowa motorcycle registrations in 1976 increased 1200% over those of 1960 (11,668 in 1960 and 151,131 in 1976). This increase was characterized by a rapid rate of growth from 1964 through 1974, and a diminishing growth rate from 1975 through 1976. The motorcycle fatalities growth trend corresponded to that of registrations during the 1974-1976 period. Motorcycle registrations accounted for 6.5% of total vehicle registrations for this period, while motorcycle fatalities accounted for 9.1% of the total traffic fatalities. Multivehicle crashes in which motorcyclists were at fault usually involved violations of traffic laws. (Speeding and driving after drinking were the most frequent violations.) For the other motorists, failure to yield to the motorcyclist, drinking, and improper turns were the most frequent violations. In 1976, 20% of the fatalities were passengers on motorcycles compared to 8.5% in 1974 and 1975. There was a decrease in fatalities during the period when the helmet law was in effect, and an increase post-repeal.

by Aurora P. Berenguel
Governor's Hwy. Safety Office, Office for Planning and Programming, Des Moines, Iowa 50319
1977 ; 43p
Prepared in cooperation with National Hwy. Traffic Safety Administration, and Federal Hwy. Administration.
Availability: Corporate author

HS-026 627

TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES

This guide, intended for those needing detailed statistical data on transportation accidents, mainly cites serial publications, but a few special reports and studies of special interest have been included. Annotations are provided to indicate sample size and/or arrangement and detail of data. The sources are categorized as multi-modal, air, bicycle, mass transit, motor vehicle, pipeline, rail, or water.

by Elizabeth R. Carter, comp.
University of California, Berkeley, Inst. of Transportation Studies Library, Berkeley, Calif.
Rept. No. UCB-ITS-LR-79-2 ; 1979 ; 11p
Availability: Corporate author

HS-026 628

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT

A linearized model of the pitch-heave dynamics of a Tracked Ram Air Cushion Vehicle is presented, based on aerodynamic theory which has been verified by wind tunnel and towed model experiments, The vehicle is assumed to be equipped with two controls which can be configured to provide various suspension system characteristics. The ride qualities and dynamic motions of the rigid vehicle moving over a guideway described by roughness characteristics typical of highways are examined in terms of the root mean squared (rms) values of the vertical acceleration in the foremost and rearmost seats in the passenger cabin and the gap variations at the leading and trailing edges of the vehicle. The improvement in ride qualities and dynamic behavior which can be obtained by passive and active suspension systems is examined and discussed. Optimal regulator theory is employed to design the active suspension system. The predicted rms values of the vertical acceleration in the one-third octave frequency bands are compared with the vertical International Organization for Standardization Specification. It is shown that marked improvements in the ride qualities can be obtained with either the passive or active suspension system.

by R. A. Luhrs; L. M. Sweet; H. C. Curtiss, Jr.
Princeton Univ., Dept. of Mechanical and Aerospace Engineering, Princeton, N.J. 08540
DOT-TSC-682
Rept. No. DOT-TSC-RSPA-78-23 ; 1979 ; 132p 14refs
Rept. for Sep 1976-Sep 1977.
Availability: NTIS

HS-803 826

EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER

Coordination of state emergency medical service (EMS) programs and improvement of state EMS standards for training and equipment is urged in order to reduce pre-hospital mortality and morbidity. A statewide EMS program using state, regional and community EMS advisory councils is recommended. Courses developed for the Emergency Medical Technician (EMT) include a basic training program, EMT Paramedic, First Responder Training Course, Crash Victim Extrication and Emergency Vehicle Operator Courses, Dispatcher Training Program for EMT's Refresher Training Program for EMT's, Handling Hazardous Materials and Transportation Emergencies, and a CB Monitor Training Course. Original certification of personnel and a system of recurrent evaluation and training is needed to insure continuing capability. Telephone and radio constitute the two major elements of the EMS communication system. Full implementation of "911" as the universal emergency telephone number should increase coordination among emergency service agencies. In radic telecommunication, a block of frequencies in the UHF band is allotted to the EMS system, while the National Emergency Aid Radio program promotes incident reporting by CB radio from automobiles and trucks. All ground ambulances should conform to Federal Specification KKK-A-1822A, and should also carry extrication tools, unless escorted to all accidents by a rescue vehicle specifically so equipped. The provision of emergency medical services is essentially a local or community matter, and the particulars of local operation are best determined at the community level. Model legislation for Emergency Medical Services is appended.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1979 ; 20p
Availability: Corporate author

HS-803 857

MOTORCYCLE HELMET USE. ISSUE PAPER, REV.

At issue is the repeal or serious weakening of motorcycle helmet laws by 27 states since the enactment of the 1976 Hwy. Safety Act. Helmet use is recommended as part of an effective motorcycle safety program which should also include rider education, improved operator licensing requirements, conspicuity enhancement, vehicle inspection, and public information activities to inform other motorists about the rights and limitations of motorcycles, and the need for sharing the road safely. The organized opposition to mandatory motorcycle helmet use is noted, especially in California. ABATE (A Brotherhood Against Totalitarian Enactments) and the American Motorcycle Assoc. are the main sources of organized opposition, which involves letter-writing campaigns, public demonstrations, and attendance and testimony at legislative hearings. Helmet effectiveness studies have shown that helmet use is 95%-100% in states with helmet legislation and 40%-60% in states with no law or a weakened helmet use law; that head injury is two times higher and fatal head injury is 3-9 times higher for nonhelmeted riders. Laws requiring helmet use by persons under 18 years of age have been relatively ineffective (40% of fatally injured riders under 18 are wearing helmets). Unhelmeted riders receive more severe head injuries, requiring longer hospitalization and more costly medical care. Voluntary use promotion is unlikely to be effective. The majority of the motoring public and about half of the motorcyclists favor helmet laws. No data indicate that increased accidents or increased injury severity result from wearing helmets. Enactment and enforcement of motorc
helmet laws for operators and passengers are considered
most effective state action to reduce motorcycle injuries
deaths. An excerpt from the Model Uniform Vehicle Coc
appended.

National Hwy. Traffic Safety Administration, Traffic Safety
Programs, Washington, D.C. 20590
1980 ; 6p
Availability: NHTSA

HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS ANI EXISTING PROFESSIONAL STANDARDS. VOL. 1 TECHNICAL REPORT. FINAL REPORT

Existing professional standards and model codes related to
processing of drinking-driving cases through the courts v
examined in order to determine their adequacy and appropri
ness. A technical analysis and comparison of existing stand
and codes in terms of real-world needs and problems in adj
cation of drinking-driving cases were performed by the Am
can Bar Assoc. (ABA). A 13-member study team, consis
primarily of representatives of standards-producing national
ganizations, met several times to monitor the development
the technical analysis, to assess the adequacy of existing sta
ards in view of needs, to plan and conduct a Conference
National Standards for Drinking-Driving Cases (held in Ch
go, 13-14 Oct 1978), and to prepare recommendations for fu
standard and code development. It is recommended that new
supplemental standards for drinking-driving cases should be
veloped where existing standards are silent, inadequate, inap
cable, or conflicting. Standards-producing organizations sho
examine and improve, if necessary, existing standards and co
in their area of responsibility. There should be a new, comp
hensive set of criminal justice standards specific to drunk d
ing. The ABA should provide leadership in conducting
standards-setting project. The Dept. of Justice (DOJ) and De
of Health, Education, and Welfare (DHEW) should take pri
ry responsibility for leadership. Joint DOJ, DHEW, and De
of Transportation funding should be provided. The creation c
model code or uniform act dealing specifically with drinki
driving case adjudication is deemed inappropriate at this ti

by Gary J. Scrimgeour; James A. Palmer; H. Lynn Edwards;
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60th St., Chicago, Ill. 60637; Indiana Univ., Inst. for Res. in
Public Safety, 400 East 7th St., Bloomington, Ind. 47405
DOT-HS-7-01625
1978 ; 159p refs
Rept. for May 1977-Dec 1978. Vol. 2, Analysis of Standards a
Codes, is HS-804 129.
Availability: NTIS

HS-804 129

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT

A technical analysis and comparison of existing standards a
codes related to the processing of drinking-driving ca
through the courts in terms of real-world needs and adjudic
tion problems found that standards do not focus on particul

crimes. Relevant uniform codes and model statutes do, however, offer substantive definition for specific crimes, including drinking-driving offenses. To a great extent, the many standards on criminal justice, by their general application, do address the adjudication of drinking-driving cases. It is concluded that standards concentrate on problems commonly arising in the adjudication of all crimes; they do not as a rule address drinking-driving specifically nor do they identify or deal with problems unique to that offense despite their general applicability. The special issues which differentiate a drinking-driving case are not addressed by existing standards and codes, which do not deal adequately and appropriately with judicial processing of such cases.

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DOT-HS-7-01625
1978 ; 86p refs
Rept. for May 1977-Dec 1978. Vol. 1, Technical Report, is HS-804 128.
Availability: NTIS

HS-804 595

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS

The current status of state laws and Federal regulations concerning vehicle hazard warning lights (sometimes called "four-way flashers") is reviewed in the context of comparable provisions of the Uniform Vehicle Code. Many states have adopted laws authorizing or requiring these lights and regulating their use, but there is a rather substantial difference in provisions of dealing with use. The most significant issue involves use of vehicle hazard warning lights on a moving vehicle. Currently, this use is prohibited for vehicles subject to Federal Motor Carrier Safety Regulations. If most vehicles can and do display four-way flashers to denote a moving vehicular hazard, it is very doubtful that the Bureau of Motor Carrier Safety regulations can effectively reserve this flashing signal to denote a stopped vehicle hazard only. Use of four-way flashers on a moving vehicle is required under certain conditions by one state, and one state toll-road authority. Such use is specifically allowed by 32 states, and another 11 do not prohibit it specifically. A number of states now require or authorize the use of four-way flashers on various kinds of moving vehicles (e.g. farm tractors, highway maintenance equipment, tow trucks). There is need for a broad-based policy decision regarding the use of vehicle hazard warning lights (uniform implementation in all jurisdictions and for all vehicles). A second issue involves the validity of all the state laws in light of Federal Motor Vehicle Safety Standards, specifically in terms of the states' overall role in regulating vehicle equipment. Congressional amendment of Section 103(d), the preemption section of the National Traffic and Motor Vehicle Safety Act, would alleviate the confusion caused by the current language.

by John W. English; Robert S. Want
Biotechnology, Inc., Falls Church, Va.
DOT-FH-11-9385
Publ: Traffic Laws Commentary v8 n4 (Apr 1979)
1979 ; 48p refs
Prepared as a component of an interim report and experimental plan entitled "Safety Aspects of Using Vehicle Hazard Warning Lights."
Availability: GPO, stock no. 050-003-00356-5

HS-804 729

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY

This bibliography represents literature acquired since the establishment of the National Hwy. Traffic Safety Administration (NHTSA) concerning child and infant restraints in automobiles. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal "Highway Safety Literature" (HSL) and are indexed by a Keyword-out-of-context listing, author, corporate author, contract number, and report number. The documents were cited in Dec 1967-Feb 1979 issues of HSL. They may be examined in the Technical Reference Branch, NHTSA. Availability is given in the individual citations.

by Lois Flynn, comp.
National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washignton, D.C. 20590
Rept. No. SB-34 ; 1979 ; 78p
Availability: NTIS

HS-804 730

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY

This bibliography represents literature acquired since the establishment of the National Hwy. Traffic Safety Administration (NHTSA) concerning the development and use of shoulder harnesses in motor vehicles. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal "Highway Safety Literature" (HSL) and are indexed by a keyword-out-of-context listing, author, corporate author, contract number, and report number. The documents were cited in Dec 1967-Dec 1978 issues of HSL. They may be examined in the Technical Reference Branch, NHTSA. Availability is given in the individual citations.

by Lois Flynn, comp.
National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washington, D.C. 20590
Rept. No. SB-35 ; 1979 ; 105p
Availability: NTIS

HS-804 745

AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT

An analysis is presented of the potential use of advanced composite materials (acm's) in automotive structures, based on the relative mechanical properties and costs of these materials and mild steel. The potential weight reduction obtainable by substituting ACM for steel in various components was analyzed on a functionally equivalent basis for a wide variety of fiber composites and system geometries. ACM'S considered were resin matrix, graphite fiber, graphite fiber/glass hybrid composites, and glass fiber composites. Continous fiber glass composites can offer significant weight reduction in selected applications while potentially offering cost savings to the manufacturer. Graphite glass hybrids offer the potential for increased weight reduction but at a higher manufacturers' cost. At graphite prices of $6/lb to $10/lb, these hybrids would be competitive with steel in terms of manufacturing costs, and less expensive than either steel or fiber glass composites on a life-cycle basis. If all graphite fiber composites were used, a further weight decrease would be realized, but at a prohibitively high increase in manufacturing and life-cycle vehicle costs. A discussion is included of additional problems and issues to be resolved prior to extensive use of ACM in production vehicles: durability, damageability, repair, noise vibrations and handling, recycling, and graphite fiber release. NTIS

by Robert Kaiser
Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154; Argos Associates, Inc., 12 Glengarry, Winchester, Mass. 01890
DOT-HS-7-01789
1978 ; 236p refs
Rept. for Apr-Jun 1978.

HS-804 774

DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT

A comprehensive review and analysis of the literature on the relationship between drugs (other than alcohol alone) and highway safety was undertaken to assess the state of current knowledge, to specify information needs, and to develop research recommendations. Information is presented on historical perspectives and the structure of drug and driving research, major topics in drug and driving research, and the identification of drugs of interest. Epidemiological and experimental research to describe the involvement of drugs in motor vehicle accidents is reviewed, as well as the underlying concepts of countermeasures and their constraints. Methodologic issues, problem areas, and information needs in drug and driving research are extensively discussed. Conclusions and recommendations for near-term research are developed, and a systematic program of research suggested. Appended are tabular summaries of experimental studies of drug effects on driving-related skills (references included), a review of present knowledge about the relationship between drug levels in body fluids and their effects on human performance, and a review of the state of the art in drug analysis as it applies to highway safety. It is concluded that existing information is not sufficient to determine the extent to which drugs (alone or with alcohol) increase traffic crash risk; the way in which drugs may alter human behavior to increase that risk; the significance of experimental results demonstrating the effects of drugs on behavior; and the significance of drug concentrations in body fluids.

by Kent B. Joscelyn; Ralph K. Jones; Roger P. Maickel; Alan C. Donelson
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor,Mich. 48109
DOT-HS-5-01217
Rept. No. UM-HSRI-79-1 ; 1979 ; 394p 427refs
Rept. for Jul 1975-Aug 1978. See also "Alcohol and Highway Safety 1978; A Review of the State of Knowledge. Summary vol.", HS-805 172.
Availability: NTIS

HS-804 790

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]

The effect of warning drivers renewing their license in Kansas that they may be retested in the examining station was investigated. The warning was stamped on the renewal examinatio notice that along with a brief handbook (containing all th correct answers) and an eye test form is mailed every four year to each licensed driver in the state. The drivers complete th exam, have their eyes tested either by their doctor or at th station, and submit the completed exam. If they miss more tha two questions, the applicants retake the exam or they may b required to show additional support for their application, suc as taking a road test. To evaluate the effect of the warning, comparison was made of the results of two groups of renewa applicants on a closed-book retest in the station. The first grou received a letter describing the project, and a two-page questionnaire, along with their renewal materials. The second grou additionally received a warning. Although the warning greatly reduced the difference between the average number of misse at-home and those in the station, it did not improve the genera test scores, nor did it significantly differentiate between th groups on the basis of the probability of doing better or wors on the retest, nor lead to different distributions of test scores. In no case did these scores correlate with geography, age, sex, years of driving, miles driven last year, hours of driving pe day, number of licensed drivers in the household, or education level.

by Lawrence F. Keller; Arie Halachmi; William Kirby; James W. Weber
University of Kansas, Inst. for Social and Environmental Studies, 607 Blake Hall, Lawrence, Kans. 66045
NHTSA-6-A273
1978 ; 78p 14refs
Rept. for Sep 1976-Dec 1978.
Availability: NTIS

HS-804 829

MODEL ICE CREAM TRUCK ORDINANCE

The Model Ice Cream Truck Ordinance (MICTO) is presented, designed to prevent child pedestrian accidents at ice cream vendor locations. This ordinance is seen as more comprehensive and stringent than the Indianapolis City-County General Ordinance No. 108 (enacted in 1971) upon which it is based. It contains a multitude of restrictions on where and how vending may take place. Graphic and verbal specifications of the mandated safety equipment are also provided to promote uniformity. A version of the model regulation was field tested in Detroit and resulted in a 77% decrease in accidents among children from a three-year average of 48.7 down to 11 in 1977. The MICTO addresses where and how a vendor may sell, required inspection, inclusion of a convex mirror, prohibition of unauthorized riders, and authorization of exemptions (i.e. trucks which do not sell to children, such as "lunch wagons").

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 10p refs
Availability: NHTSA

HS-804 833

CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT

An experiment was designed to evaluate the contributions made to highway safety by the use of Citizen's Band (CB) radio by state police, using State Police Troop "D" and Zone III of the New York State Thruway, Troop "T", north-central New York State. The project demonstrated that state police use of CB radio improves response times to requests for assistance, increases the number of reports on unsafe driving acts and conditions, increases public and state police participation in reporting and responding to highway safety-related incidents, and provides for a public/state police interface. Also described are results of two opinion polls: a public opinion poll taken in Maryland (no official CB radio program) and a poll of New York State Troopers who participated in the CB project. The public opinion poll indicated a high level of acceptance for state police use of CB radios. A high level of trooper acceptance was found as well, with agreement among troopers that CB radio use helps them in performing their duties. Recommendations are presented on how the effectiveness of CB radio and related communication systems supporting the highway system can be improved. Examples of public information and education efforts are appended: announcements by the Governor, New York State Police Superintendent, and Troops "D" and "T" (in newspapers and news releases), bumper stickers, brochures and road signs. Also appended is a discussion of the training program for troopers and CB operators.

by Nicholas F. Giangualano; Kenneth S. Crounse; Ronald G. McPhail; Henry F. DeFrancesco
New York State Police, Traffic Section, Public Security Bldg. 22, State Campus, Albany, N.Y. 12226; Advanced Technology Systems, Inc., 2425 Wilson Blvd., Arlington, Va. 22201
DOT-HS-6-01436
1977 ; 166p 1ref
Rept. for Jul 1976-Oct 1977. Cover date is 1979. Vol. 1 is HS-803 581.
Availability: NTIS

HS-804 854

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT

A project was designed to forecast the possible moped accident problem that may develop in the U.S. over the next five to ten years: to formulate a procedure for predicting the nature and scope of the problem; to use the procedure to predict outcomes corresponding to such input values as sales volume, usage patterns, and crash rates; and based on the output, to recommend National Hwy. Traffic Safety Administration research and safety program action. Foreign literature sources are examined to identify and describe the use of the moped in other countries and to relate this where possible to the U.S. experience. Reviewed topics include moped legislation in other countries and the U.S.; numbers of mopeds, extent of usage, and user characteristics; accident data (primarily rider and environment); collision characteristics; and the nature of injuries to accident-involved moped riders. Appended are a review of Docket 75-29, Motorized Bicycles (Mopeds); a market survey report (prepared by Management Analysis Center, Inc.) on U.S. moped sales and user characteristics; and selected tables of interest.

by William W. Hunter; Jane C. Stutts
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
DOT-HS-8-01887
1979 ; 371p refs
Rept. for Feb 1978-May 1979. Vol. 2 is HS-805 036.
Availability: NHTSA

HS-805 045

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY

This bibliography represents literature acquired since the establishment of the National Highway Traffic Safety Administration (NHTSA) concerning the handling and stability of motor vehicles. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal "Highway Safety Literature" and are indexed by a key-word-out-of-context (KWOC) listing, author, corporate author, contract number, and report number. Documents listed may be examined in the Technical Reference Branch, NHTSA, Room 5108, 400 Seventh St., S.W., Washington, D.C. 20590. Availability is given in the individual citations.

by Lois Flynn, comp.
National Hwy. Traffic Safety Administration, Technical Reference Branch, Washington, D.C. 20590
1979 ; 344p refs
Repts. for Jan 1967-Jul 1979.
Availability: NTIS

HS-805 077

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT

Testing was conducted to analyze the interrelationships between and the effects of automobile interior surfaces on driver injury. Testing was limited to frontal impacts of subcompact vehicles. At velocities near 20 mph, variations in steering wheels, steering columns and knee restraints did not substantially affect the driver's injury severity as described by FMVSS 208. At velocities near 25 mph, these effects became evident. Steering wheels which deform easily in a mode which aligns the steering wheel rim and hub to the driver's torso result in significant reductions in the driver's chest injury severity. The tube and mandrel type steering column, designed to reduce binding due to bending forces, produced less chest injury. The passive knee restraint substantially increased driver femur forces. With no knee restraint the driver submarined under the steering wheel and instrument panel, whereas with the knee restraint, the forward translation of the driver's knees was restricted, causing the driver to rotate about the H-point into the steering wheel and windshield. This reduced head and chest injury, but contributed to neck hyperextension. Photographs illustrate various components, test methods and results. Sled and barrier test results are appended.

by Kingdon Humann; Anil V. Khadilkar
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01449
Rept. No. FR-1061-07-79 ; 1979 ; 389p 15refs
Rept. for Sep 1976-Jul 1979.
Availability: NTIS

HS-805 145

NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT

The National Parts Return Program (PRP) involves the voluntary submittal by independent automotive repair facilities of failed automotive components and failure reports to assist the NHTSA in identifying the existence of safety-related manufacturing defects in design, materials, construction, or performance of motor vehicles and motor vehicle equipment. For the feasibility study, personal visits were made to 300 new car dealers, 300 automotive parts suppliers and 100 high mileage fleets to enlist support. Various follow-up and incentive techniques were then employed to develop active participation. More than 3/4 of the dealers contacted agreed to participate, and almost 100% of the fleets and parts suppliers. During the second phase of the program, the high mileage fleets contributed most; parts suppliers and dealers contributed less, giving as explanation that they rarely saw defective parts. It is recommended that the study be continued, with non-active dealers and parts suppliers replaced by additional high mileage fleets, and that a wider variety of fleets be included, such as those who do not perform their own maintenance. Frequent telephone reminders and material incentives are suggested. Appended are association reports, the field representative information kit, field enrollment kit, certificate of participation and acknowledgement letter, and a list of new participants by region.

by M. Lowery; P. Karawanny; B. Miller; R. Recard
Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
DOT-HS-6-01433
Rept. No. KAPPA-DOT-79-01 ; 1979 ; 140p
Rept. for 1 Jul 1978-30 Jun 1979. Vol. 1, Independent Repair Facilities, is HS-805 144; Vol. 3, PRP News and Program Inputs, is HS-805 146.
Availability: NTIS

HS-805 146

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT

This volume contains the year's newsletter matrix, with items listed according to vehicle or equipment manufacturer, and Vol. 4 of the Parts Return Program News for the period from 1 July 1978 to 30 June 1979, as well as monthly summaries of parts received from 1 July 1978 to August 1979.

by M. Lowery; P. Karawanny; B. Miller; R. Recard
Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
DOT-HS-6-01433
Rept. No. KAPPA-DOT-79-01 ; 1979 ; 266p
Rept. for 1 Jul 1978-30 Jun 1979. Vol. 1, Independent Repair Facilities, is HS-805 144; Vol. 2, The Expansion Study, is HS-805 145.
Availability: NTIS

HS-805 152

IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT

Some preliminary evaluations are reported of the effectiveness of three motorcyle licensing programs and remedial training with a sample of 40,874 subjects (1976, 1977, and 1978 applicants for the original motorcycle license). The driver record analyses indicated a statistically significant (13%-20%) reduction in motorcycle accident frequencies during the year after application in each of the two improved licensing programs, in comparison with the present program. Comparisons of the licensing programs by the other criterion measures revealed that the two improved programs did not differ from the present program in their impact on motorcycle and automobile convictions, automobile accidents, and total accidents and convictions. The driver record evaluation of training revealed a trend indicating that the training program was effective in reducing the incidence of motorcycle accidents during the year after application. This reduction could be due to the screening effect of the two improved programs which reduced motorcycle driving exposure and discouraged more applicants with poor motorcycle driving records from obtaining a license, and/or to the skill upgrading effect of the two improved programs; the training evaluation suggested that the screening process was the more effective. Future evaluations should study the influence of skill upgrading. Appended are data collection forms, analyses of 1977 California motorcycle accidents, and a study of the covariates selected for the analyses of covariance.

by Jack L. Ford; James Anderson
California Dept. of Motor Vehicles, 2415 First Ave., Sacramento, Calif. 95818
DOT-HS-5-01196
Rept. No. NHTSA-CAL-DMV-FOO-79-1 ; 1979 ; 113p 25refs
Rept. for 1 Jan-31 Dec 1978
Availability: NTIS

HS-805 165

1979 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT

The survey, sponsored by the National Hwy. Traffic Safety Administration as part of a systematic effort to monitor perceptions on highway safety issues, includes the following four major areas of interest: the 55 mph national speed limit, safety belts, 1984 requirements for airbags or similar passive restraint or crash protection devices, and driving after drinking. A scientifically selected national sample of 1500 licensed drivers was interviewed by telephone concerning their attitudes, knowledge, and behavior with respect to the above issues. The survey also assessed drivers' awareness of public information and education campaigns, and their perceptions of accident risk. A description of the procedures and results of the survey are given. It was found that the majority of drivers overestimate their ability to avoid accidents and seriously underestimate the actual risk of one. Seventy-five percent consider the avoidance of drinking and driving the most important measure to increase safety on highways. Only 24% report regular use of safety belts, but the majority support legislation requiring everyone to wear a belt; greatest support favored a law requiring children under age five to ride in a special safety seat (84%). Automatic safety belts would be accepted by 63%; 32% would try to disconnect them. Airbags were favored by 51% and belts by 40%. The 55 mph speed limit was favored by 77%, 75% were in favor of keeping it (a support level constant for the past three years), and 76% feel the law should be enforced with a 5 mph tolerance. Public recollection of public information messages increased in 1979 over 1978 for drinking and driving, safety belts, and the 55 mph speed limit, but drivers were unable to recall any specific message. The telephone questionnaire format is appended.

Teknekron Res., Inc., 1483 Chain Bridge Rd., McLean, Va. 22101
DOT-HS-6-01424
1979 ; 94p 1ref
Rept. for May-Aug 1979.
Availability: NTIS

HS-805 166

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT

A statistical analysis is presented of preliminary data for the Driving Knowledge Test, one of the intermediate measures to be used in evaluating the Safe Performance Curriculum. The test, a 56-item multiple choice test, is administered on a pre/post basis to randomly formed groups of Safe Performance Curriculum (SPC) and Pre-Driver Licensing (PDL) students. During the second project year, Control students will also be administered this instrument. The analysis includes assessment of the reliability of the knowledge test, analysis of test score distributions, comparative analyses of SPC and PDL group test performance, assessment of students' level of mastery of knowledge required for the driving task, as shown by the test, and identification of any student knowledge deficiencies. Principal findings and conclusions include: that the reliability of the test is estimated to be approximately r[illegible].80, which may be considered an adequate level of reliability for a nonstandardized achievement test; that the SPC program is superior to the PDL program in terms of driving knowledge gained by students, as measured by the test (this superiority holds true for any type of student defined by sex, socioeconomic status level, and grade-point average, as well as for subtests of the total test); and that SPC students acquire a high level of mastery of knowledge required for the driving task, as measured by the test (a mean of 48.2 on the post-test out of a possible 56). The Driving Knowledge Test and data on test scores are appended.

by Horace W. Ray
Battelle Columbus Labs., 505 King Ave., Columbus, Ohio 43201
DOT-HS-6-01462
1979 ; 69p 3refs
Rept. for Dec 1977-May 1978. Sponsored by DeKalb County School Systems, Decatur, Ga.
Availability: NTIS

HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT

Results are presented of two full-scale, head-on collisions between the NHTSA Test Device and 1975 Honda Civic CVCC two-door sedans. The test was designed to help establish a methodology for evaluating crash compatibility and aggressiveness. The Test Device is a unique, honeycomb-faced load-measuring tool which is adaptable to both moving and fixed barrier collisions. Data presented include graphical and tabular presentations of vehicle deformation, Test Device load cell data, vehicle and simulated occupant acceleration, velocity, and displacement values, dynamic displacement of string potentiometers, and restraint survival distances. Also included are tabular summaries of occupant injury criteria, exterior and interior static vehicle deformation, and restraint system loads and vehicle descriptions. Data for a 40mph fixed Test Device collision is compared to that for an "equivalent" moving Test Device collision.

by R. Yee; S. Davis
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-7-01758
Rept. No. 8316-78-70B ; 1979 ; 234p
Rept. for Apr-sep 1978. Vol. 2, Final Technical Report, is HS-805 167; Test Reports 2-4 are HS-805 169--HS-805 171.
Availability: NTIS

HS-805 171

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT

Results are presented of two full-scale, head-on collisions between the NHTSA Test Device and 1975 Plymouth Fury four-door sedans. The test was designed to establish a methodology for evaluating crash compatibility and aggressiveness. The Test Device is a unique, honeycomb-faced, load-measuring tool which is adaptable to both moving and fixed barrier collisions. Data presented include graphical and tabular presentations of vehicle deformation, Test Device load cell data, vehicle and simulated occupant acceleration, velocity and displacement values, dynamic displacement of string potentiometers, and restraint survival distances. Also included are tabular summaries of occupant injury criteria, exterior and interior static vehicle deformation, and restraint system loads and vehicle descriptions. Data for a 40-mph fixed Test Device collision is compared to that for an "equivalent" moving Test Device collision.

by R. Yee; R. Cropper; S. Davis
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-7-01758
Rept. No. 8316-78-146A ; 1979 ; 226p 1ref
Rept. for Jun-Oct 1978. Vol. 2, Final Technical Report, is HS-805 167; Test Reports 1-3 are HS-805 168--HS-805 170.
Availability: NTIS

HS-805 227

NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT

The National Crash Severity Study (NCSS) is a major accident data collection program of the National Center for Statistics and Analysis of the National Hwy. Traffic Safety Administration. Data collection began in Jan 1977 and terminated in Mar 1979. The tabulations in this factbook represent the first 15 months of the program (Jan 1977-Mar 1978). Accidents were investigated in seven geographical areas within the continental U.S. selected so that the aggregate of the areas closely resembles the urbanization distribution of the entire country. Within each area a stratified sampling plan was used to gather detailed information on passenger cars (and their occupants) in crashes severe enough to require that the vehicles be towed from the scene. The combined investigations presented here account for 6626 crashes, 8616 towed vehicles, 14,491 vehicle occupants, and 485 fatalities. The tables and figures were generated using a computer file of the NCSS data and represent only a very broad treatment of the data. The tables are classified under the following headings: general, accident, vehicle, occupant, and crash severity (Delta V). A subject index is provided.

by Leda Ricci
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-HS-8-01944
Rept. No. UM-HSRI-79-80 ; 1979 ; 112p
Rept. for Jan 1977-Mar 1978.
Availability: NTIS

HS-805 235

MAINTENANCE OF CRASH2 PROGRAM. FINAL REPORT

Work is described which was undertaken to resolve problems resulting in errors or inconsistencies in the CRASH2 program. The modifications include fixing the CDC (collision damage or deformation classification) screening test to disallow additional invalid CDC'S; fixing the BATCH option so that multiple files may be stored and run; correcting the default damage pattern for corner collisions where CDC only is specified; and adding coding to assign a default damage length of 16 in maximum to vehicles whose CDC have an E in column 6. Expenditures are reported, and recommendations for further work in maintenance of the CRASH program are given. Attached are the first and second progress reports and a computer printout illustrating the overlay approach.

by Stephen Zaccari
Wilson-Hill Associates, Inc., 1025 25th St., N.W., Suite 700, Washington, D.C. 20005
NHTSA-9-6426
1979 ; 68p
Rept. for Mar-May 1979.
Availability: NTIS

HS-805 242

HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT

A major impediment to initiating motor vehicle diagnostic inspection programs is the high initial capital investment needed to establish inspection centers. At the present time, few of the wide range of public and private finance methods available are geared specifically toward motor vehicle diagnostic inspection programs. Innovative methods are described by which, in the absence of a specific funding mechanism, a state or local government planner or private entrepreneur may obtain required funds from currently available sources. The funding mechanisms are divided into two main categories, public and private financing, to coincide with the two basic administrative organizational approaches to the various inspection concepts. State and local government funding mechanisms are described, including Federal domestic assistance and state and locally generated revenues. The report also contains the spectrum of funding mechanisms, including commercial banks and capital investment firms, applicable to private for-profit and non-profit enterprises such as cooperatives and auto service clubs. Appended are a glossary of financial terms, a list of inspection agencies visited, and addresses of financing information sources.

by Leslie Eder
National Hwy. Traffic Safety Administration, Office of State Vehicle Programs, Washington, D.C. 20590
1979 ; 89p 6refs
Based on work performed under Contracts NHTSA-9-6691 (with Nordyke and Associates, Ltd.) and NHTSA-9-6692 (with TASCO Services, Inc.).
Availability: NTIS

HS-805 243

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT

The State of Idaho established (1 Jan 1968), and subsequently repealed (30 Jun 1976), a mandatory periodic (annual) motor vehicle inspection program (PMVI). The inspections were performed by state certified inspectors at private stations licensed by the state. This inspection met most vehicle-in-use standards of the National Highway Traffic Safety Administration (NHTSA). Following the discontinuance of mandatory periodic motor vehicle inspection, a study was undertaken by the Idaho Bureau of Highway Safety, under NHTSA sponsorship, to compare the mechanical condition of vehicles under a periodic inspection program to that of vehicles without such a program. To accomplish this objective, a "before and after" study was designed to assess any differences in the mechanical condition of vehicles subsequent to the abolition of Idaho's mandatory inspection law. Outage rates were lower during the tenure of PMVI for the brake systems of older, high mileage vehicles (4 years old, 40,000 miles or more), for steering, suspension, and powertrain subsystems for cars of all ages and mileage. Only subsystems which were visible, accessible, and easily maintained (brake lights, turn indicators, and window glass) showed no difference in outages, pre- and post-repeal of PMVI. It was concluded that Idaho's vehicles were in better condition under their PMVI program than they are now without such a program, as measured by subsystem outage rates.

by Leslie Eder
National Hwy. Traffic Safety Administration, Office of State Vehicle Programs, Washington, D.C. 20590
1980 ; 31p
Availability: NTIS

HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT

A. T. Kearney, Inc., 699 Prince St., Alexandria, Va. 22313
DOT-HS-7-01787
Rept. No. G-167-Vol-1 ; 1979 ; 24p
Rept. for Oct 1977-Apr 1979. For abstract, see HS-805 245, Vol. 2, Technical Report.
Availability: NTIS

HS-805 245

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT

Means were developed for assessing competition among domestic and foreign automotive corporations by which impacts on competition in response to Federally mandated fuel economy standards are identified and analyzed. In the areas of engineering/design and product planning, relatively modest competitive impacts are projected, although manufacturers in the smaller car segments appear somewhat vulnerable near-term to image erosion caused by a reduction in available design alternatives. More severe risks to the stability of the industry's competitive structure are foreseen in the area of product pricing and overall marketing strategy. These risks are due to incentives inherent in the corporate average fuel economy standards for cross-subsidization in the marketing of different size classes. Incentives for pursuing alternative marketing strategies are analyzed in the context of the Wharton E.F.A. (Economic Forecasting Associates) automobile demand forecasting model. The analysis suggests that incentives do exist for relatively modest adjustments in pricing mix. Since the relative attractiveness of such strategies declines rapidly as they are pursued more intensively, the major threat to competitive equilibrium from this source is the extent to which the automakers fall short of their timetables of technological improvements to achieve the standards.

A. T. Kearney, Inc., 699 Prince St., Alexandria, Va. 22313
DOT-HS-7-01787
Rept. No. G-167-Vol-2 ; 1979 ; 368p refs
Rept. for Oct 1977-Apr 1979. For summary report, see HS-805 244.
Availability: NTIS

HS-805 246

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT

The following 1979 makes and models of passenger cars were tested in the New Car Assessment Prog. to evaluate compliance with FMVSS (Federal Motor Vehicle Safety Standard) No. 212, Windshield Mounting; No. 219, Windshield Zone Intrusion; and No. 301-75, Fuel System Integrity: BMW 529i, Ford Fiesta, SAAB 900GL, Toyota Corolla, and Volvo 244DL. Time histories and resultant values are given for acceleration, velocity and displacement on each vehicle, as well as pre- and post-crash photographs and damage dimension diagrams. Data were also collected for the Accident Investigation Div. by using instrumented Part 572 dummies and accelerometers.

by Lloyd E. Carlson
Mobility Systems and Equipment Co., 6151 West Century Blvd., Suite 912, Los Angeles, Calif. 90045
DOT-HS-9-02136
Rept. No. R-NS79-14-02 ; 1979 ; 85p
Rept. for 15 Aug-15 Dec 1979.
Availability: NTIS

HS-805 247

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT

Two impact tests were conducted on ferrous wheels using the proposed procedure ISO/TC22/SC19/WG3-N15 to compare the nature and extent of failures, to assess the significance of material strength and ductility, and to determine the adaptability of the tests to a Federal Standard. The test machine, which was designed and fabricated for the original contract, was modified. Eight aluminum wheels were procured, of which two from Cragar were tested and passed. The six remaining wheels and test machines were shipped to the National Hwy. Traffic Safety Administration. Appended are photographs of the test machine and wheel impacts, and an outline of the test procedure.

by Jerry G. Wallingford
EGandG Automotive Res., Inc., 5404 Bandera Rd., San Antonio, Tex. 78238
DOT-HS-7-01657
Rept. No. 51002 ; 1978 ; 19p
Rept. for May-Sep 1978. See also HS-803 351.
Availability: NTIS

HS-805 248

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY

A study was undertaken to determine the frequency of alcohol involvement in adult (14 years) pedestrian fatalities and injuries; to determine if alcohol was overrepresented; to determine the causal role of alcohol; and to suggest countermeasures. Pedestrian fatalities were sampled through the New Orleans, La., Coroner; non-fatal pedestrian victims were sampled through a large New Orleans hospital; and crash and control data were gathered via follow-up interviews, roadside interviews and police files. Results showed that 50% of the pedestrian fatal and non-fatal victims had been drinking. Blood Alcohol Concentrations (BAC'S) were extremely high. Approximately 50% of those who had been drinking had BAC'S of .20% or higher. Victims were compared to three distinct control groups. The most conservative group (age and sex matched at the accident site) showed relative risk of an accident increasing dramatically at BAC'S of .20% or more. The least conservative (Random group) showed relative risk increasing dramatically at BAC'S of .10% or more. Alcohol involved pedestrians were more often middle aged males, struck at night or on weekends, who exhibited a variety of social and personal problems. "Dart and Dash," "Ped Strikes Vehicle" and "Not Classifiable" accident types were common. Legal, educational, engineering and rehabilitation countermeasures are discussed.

by R. D. Blomberg; D. F. Preusser; A. Hale; R. G. Ulmer
Dunlap and Associates, Inc., 1 Parkland Drive, Darien, Conn. 06820
DOT-HS-4-00946
Rept. No. ED79-11S ; 1979 ; 43p 18refs
Rept. for Jun 1974-Oct 1979
Availability: NTIS

HS-805 250

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT

Performance and handling tests on the Calspan Research Safety Vehicle (RSV) were performed in Italy by the Istituto Sperimentale Auto e Motori (ISAM) and in West Germany by Volkswagenwerk AG, Wolfsburg. The ISAM tests evaluated the Calspan RSV in the areas of fuel economy, vehicle response, braking and handling, and driver environment. The Volkswagen tests evaluated the Calspan RSV in the areas of braking, steering, handling, and overturning immunity. Since the ISAM tests are unlike any previously used to evaluate American vehicles, the Calspan RSV results are compared to those of ten European cars which had undergone identical tests. The Volkswagen test procedures were identical to those specified in the Research Safety Vehicle program. The Calspan RSV results are compared to the RSV specifications for these tests. The RSV exhibited generally lower performance than the European cars in tests of engine performance (power at the wheels, maximum speed, speed track performance, and acceleration and pickup), although the RSV met specification requirements related to passing times. Fuel consumption of the RSV compared favorably with that of European cars, and the braking capability of the RSV was better than any of the European cars. The Calspan RSV met all of the specifications in the Volkswagen tests except those in the slalom tests. Appended are individual test data from the ISAM test program and the tests conducted by Volkswagen AG, as well as a summary of test results.

by N. Johnson; S. Davis
Dynamic Science, Inc., 1850 Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-9-02095-T.O.-1
Rept. No. 6071-79-107A ; 1979 ; 63p
Rept. for Apr-May 1979.
Availability: NTIS

HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT

The results are reported of a 75 degree right side impact collision between a Renault R20TS and the Calspan Research Safety Vehicle (RSV) No. 4. The Calspan RSV, the stationary target vehicle, was struck in the right side by the Renault bullet vehicle. The test, which was conducted by Renault, evaluated the structural integrity and dynamic response of the Calspan RSV, and the dynamic response of its three occupant dummies. Appended are the data plots for vehicles and dummies, a summary of test results, and the following conclusions. All three dummies in the Calspan RSV were within the allowable FMVSS 208 head injury criteria. The left front and right rear dummies met the FMVSS criteria for chest resultant acceleration, the right front dummy did not. The reinforced structure of the RSV, together with ample soft door padding minimizes pelvic injury indicators. Stiff padding at the tops of the doors of the RSV resulted in no observable improvement as regards the thorax. Padding the windshield pillars, center pillars, roof sills, and rear pillars limited the maximum acceleration recorded during an impact of the head.

by R. Cropper; N. Johnson; S. Davis
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-9-02095-T.O.-1
Rept. No. 6071-79-106 ; 1979 ; 90p
Rept. for Apr 1979. See also HS-805 252.
Availability: NTIS

HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.

The results are reported of a 75 degree left side impact collision test between a Renault R20TS and the Calspan Research Safety Vehicle (RSV) No. 4. The Calspan RSV, the stationary target vehicle, was struck in the left side by the Renault bullet vehicle. The test, conducted by Automobiles Peugeot in France, evaluated the structural integrity and dynamic response of the Calspan RSV, and the dynamic response of its three dummy occupants. The side door intrusion into the passenger compartment was limited to 3.8 inches maximum at the driver door, and all occupant responses met established human survival specifications. Data plots for vehicles and dummies, and a summary of significant test results and conclusions are appended.

by R. Cropper; N. Johnson; S. Davis
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-9-02095-T.O.-1
Rept. No. 6071-79-88-A ; 1979 ; 123p
Rept. for Mar 1979. See also HS-805 251.
Availability: NTIS

HS-805 254

POLICE TRAFFIC RADAR: IS IT RELIABLE?

Recent developments in police traffic radar are described and activities in performance standards and training programs by the National Hwy. Traffic Safety Administration are discussed. Results of special tests are reported on police traffic radar equipment which was questioned in a Florida judicial hearing. The researchers were concerned with the susceptibility of the radar devices to interference from citizens band and police radios, and from equipment in police vehicles (ignition, alternator, and air-conditioning and heater fans). Also examined were such phenomena as patrol speed shadowing, target speed bumping or batching, and possible errors due to panning, scanning, interpretation, and automatic lock-on feature. The results indicate that police radar is reliable when carefully installed and properly operated. It is recommended that states develop uniform standards, guidelines, and procedures for operator training and certification; equipment purchase, maintenance, testing, and certification; operating practices; and periodic recertification of equipment and operators. Included is an interim report by the National Bureau of Standards Law Enforcement Standards Lab., which provides results of a series of laboratory and field tests to evaluate the performance of six specific speed-measuring radar units.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1980 ; 40p
Availability: NHTSA

HS-805 262

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT

The results are reported of a 41 mph frontal flat barrier crash test of the Calspan Research Safety Vehicle (RSV) No. 9. Two calibrated 50th percentile Part 572 instrumented anthropomorphic dummies were placed in the driver and front passenger positions in the car. The occupant automatic restraint system consisted of an air bag mounted in the steering wheel hub for the driver, and an air belt for the passenger. These were supplemented by knee impact padding for each occupant. Due to the driver and front passenger exceeding some aspect of the FMVSS 208 Injury Criteria, the results of this test in terms of human survival were unsatisfactory. In spite of some unexpected failures of the right front door and hood latches which occurred during the crash test, the occupant compartment intrusion was not excessive, although the compartment's relatively high accelerations presented difficult conditions for satisfactory restraint performance. Appended are plots for vehicle and dummy data, documentary photographs, occupant restraint firing data, pre- and post-test dummy calibrations, vehicle modifications, and test summary. Also appended are a pre-test wheel study, and a discussion by M. Fitzpatrick of test vehicle modifications.

by R. Baczynski; S. Davis; M. Fitzpatrick
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-8-01942-T.O.-5
Rept. No. 3054-79-90A ; 1979 ; 137p
Rept. for May-Jun 1979.
Availability: NTIS

INDEX to ABSTRACTS

blank page

KWOC Title Index

ABSORBERS

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

ABSORBING

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

ACCOUNTING

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

ACTIVIST

A BICYCLE ACTIVIST LOOKS AT FACILITIES
HS-026 457

ADDRESS

KEYNOTE ADDRESS [TRAFFIC NOISE]
HS-026 568

ADHESIONS

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

ADJUSTMENT

"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]
HS-026 491

ADMINISTRATOR

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

SHARP INCREASE IN DEATHS, NHTSA ADMINISTRATOR SAYS
HS-026 432

ADVISORY

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

AFFECT

HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532

MATERIALS CHANGES AFFECT COOLING SYSTEM PERFORMANCE
HS-026 537

AGE

AN AGE ANALYSIS OF TRAFFIC ACCIDENTS AND OFFENCES
HS-026 443

COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE
HS-026 501

MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS
HS-026 619

AGENCY

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

AGGRESSIVENESS

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

AIM

ENGINES AND CYCLES AIM FOR EFFICIENCY
HS-026 622

AIR

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

AIR-TO-AIR HEAT EXCHANGERS USED FOR DIESEL INTERCOOLING
HS-026 539

CLAYBROOK RESPONDS TO THE AIR BAG CRITICS
HS-026 621

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

AIRAC

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

AIRCRAFT

IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

ALCOHOL

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

ALCOHOL FUEL: THE GREAT CLEAR HOPE
HS-026 484

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

ALHAMBRA
HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978
HS-026 549

ALIVE
KEEP 55 ALIVE [NATIONAL SPEED LIMIT]
HS-026 606

ALONG
TRANSIT DAMAGE: TROUBLE ALONG THE WAY
HS-026 556

ALREADY
SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

ALTERNATIVES
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

ALTITUDE
1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

ALUMINUM
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

AMA
AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

AMBULANCE
HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

AMERICAN
AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

AMERICANIZATION
THE AMERICANIZATION OF THE SMALL CAR
HS-026 564

ANNOYANCE
AN AUTOMOBILE NOISE ANNOYANCE PROBLEM
HS-026 623

ANSWERS
COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE
HS-026 501

ANTHROPOMETRIC
PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

ANTITRUST
UNDERSTANDING ANTITRUST CHEMISTRY
HS-026 597

APPLYING
TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

ART
INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

ARTICULATED
PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

ASSESSMENT
ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

ASSISTANCE
POWER STEERING SYSTEM VARIES ASSISTANCE WITH SPEED
HS-026 533

ASSOCIATED
ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

ASSOCIATION
AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

AUSTRALIAN

FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN
HS-026 445

AUTO

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

AUTO REPAIR: PROBING THE DEPTHS
HS-026 600

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

1,849 FAMILIES REPORT THEIR AUTO CRASH EXPERIENCE
HS-026 553

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

AUTOMOBILE

AN AUTOMOBILE NOISE ANNOYANCE PROBLEM
HS-026 623

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-TRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

AUTOMOTIVE

AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT
HS-804 745

AUTOMOTIVE ELECTRONIC SYSTEMS
HS-026 462

AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

AUTOMOTIVE FUELS--OUTLOOK FOR THE FUTURE
HS-026 505

AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK
HS-026 470

CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT
HS-805 245

SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

AUTOS

THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

AUXILIARY

WHAT YOU SHOULD KNOW ABOUT AUXILIARY TANKS [RECREATIONAL VEHICLES]
HS-026 483

AVOID

HOW TO AVOID GETTING RIPPED-OFF: BRAKES
HS-026 559

BABY

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

BAG

CLAYBROOK RESPONDS TO THE AIR BAG CRITICS
HS-026 621

BAND

CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

BARRIER

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-TRAILER PENETRATION OF MEDIAN BARRIER

AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

BARRIERS

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

BEARING

A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

BELT

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

BELTS

CANADIANS LEARN TO LIVE WITH SEAT BELTS
HS-026 430

BIBLIOGRAPHY

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY
HS-804 729

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY
HS-804 730

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY
HS-805 045

BICYCLE

A BICYCLE ACTIVIST LOOKS AT FACILITIES
HS-026 457

AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
HS-026 562

ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

STAYING AHEAD WITH [BICYCLE] HELMETS
HS-026 497

BICYCLING

FOCUS ON FACILITIES. SOME CURRENT THINKING ON "WHERE WE ARE" AND "WHERE ARE WE GOING?" [BICYCLING]
HS-026 446

BILLING

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

BIPOLAR

CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

BOARD

ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS
HS-026 536

BODIES

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

BODY

PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

BOND

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

BOTTLENECKS

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

BRAKES

HOW TO AVOID GETTING RIPPED-OFF: BRAKES
HS-026 559

BREED

A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?
HS-026 566

BRIDGERAIL

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978
HS-026 549

BUILDERS

THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

BUS

AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

BUSES

A BASIC GUIDE TO HANDICAP EQUIPMENT FOR USE ON SCHOOL BUSES
HS-026 494

CALIFORNIA

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978
HS-026 549

CALSPAN

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

CANADIAN

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

CANADIANS

CANADIANS LEARN TO LIVE WITH SEAT BELTS
HS-026 430

CAR

"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]
HS-026 491

A METHOD OF SAVING MONEY [CAR-POOLING]
HS-026 612

CAR MAKERS. WHERE THEY'LL TAKE US TOMORROW
HS-026 543

CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

THE AMERICANIZATION OF THE SMALL CAR
HS-026 564

THE END OF THE FAMILY CAR?
HS-026 524

THE IMPACT OF THE SMALL CAR
HS-026 540

CAROLINA

AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
HS-026 562

CARS

EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 433

EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE
HS-026 599

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

USED CARS
HS-026 496

WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]
HS-026 598

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

CASUALTIES

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

CAUSES

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

CHAIN

TIME FOR CHAIN MAINTENANCE [MOTORCYCLES]
HS-026 552

CHARACTERISTICS

IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

CHARACTERIZE

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

CHEMISTRY

UNDERSTANDING ANTITRUST CHEMISTRY
HS-026 597

CHILD

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY
HS-804 729

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]
HS-026 495

THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN
HS-026 620

CHILDREN

FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN
HS-026 445

CHIP

A SINGLE CHIP MICROCOMPUTER WITH SYSTEM FEATURES
HS-026 474

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

CIRCUITS

AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK
HS-026 470

CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

CITIZEN

CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

CITY

CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

CIVIC

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

CLAYBROOK

CLAYBROOK RESPONDS TO THE AIR BAG CRITICS
HS-026 621

CLEAR

ALCOHOL FUEL: THE GREAT CLEAR HOPE
HS-026 484

CLEARING

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

CMOS

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

CODES

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

COILS

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

COLLISION

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

COLLISIONS

BASIC RESEARCH ON REAR-END COLLISIONS
HS-026 482

COLLISIONS WITH UTILITY POLES
HS-026 447

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

COLLOQUIUM

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

COLOR

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

COLUMN

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

COMBUSTION

HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532

OPTIMIZATION OF DIESEL COMBUSTION RESEARCH
HS-026 431

TORCH IGNITION SHORTENS COMBUSTION DURATION
HS-026 538

COMES

SAFETY COMES FIRST WHEN TRANSPORTING THE HANDICAPPED
HS-026 493

COMMITTEE

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

COMMUNICATION

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

COMPACT

WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]
HS-026 598

COMPANY

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

COMPARATIVE

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

COMPARISON

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

COMPATIBILITY

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

COMPENSATION

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

COMPETITION

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT
HS-805 245

COMPLEMENTARY

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

COMPLIANCE

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

COMPONENTS

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

COMPOSITE

AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT
HS-804 745

COMPOSITES

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

COMPUTERS

ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS
HS-026 536

CONCENTRATED

ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

CONCEPTION

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

CONDITIONER

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER

COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

CONSERVATION
ENERGY CONSERVATION IN TRANSPORTATION
HS-026 527

CONSPICUITIES
SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

CONSPICUITY
THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

CONSUMERS
PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

CONTROL
FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

COOLERS
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

COOLING
MATERIALS CHANGES AFFECT COOLING SYSTEM PERFORMANCE
HS-026 537

COORDINATED
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

COORDINATING
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

COORDINATION
EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

CORES
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

CORRELATION
A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

COSTLY
CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

COSTS
DRUNK DRIVING COSTS, MORE THAN YOU MIGHT FIGURE
HS-026 500

COUNCIL
1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

COUNTERMEASURES
GENERAL EVALUATION OF TRAFFIC ACCIDENT COUNTERMEASURES
HS-026 481

COUPES
FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

COURT
COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE
HS-026 501

CRASH
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AG-

GRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

IOWA MOTORCYCLE CRASH STUDY 1974-1976
HS-026 626

MAINTENANCE OF CRASH2 PROGRAM. FINAL REPORT
HS-805 235

NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT
HS-805 227

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

1,849 FAMILIES REPORT THEIR AUTO CRASH EXPERIENCE
HS-026 553

CRC
1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

CREAM
MODEL ICE CREAM TRUCK ORDINANCE
HS-804 829

CRISIS
FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

CRITICS
CLAYBROOK RESPONDS TO THE AIR BAG CRITICS
HS-026 621

CURRICULUM
STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

CURVES
POWERPLANT EFFICIENCY PROJECTED VIA LEARNING CURVES
HS-026 535

CUSHION
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

CUSTOM
CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

CUSTOMERS
FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

CUSTOMIZE
STANDARDIZE OR CUSTOMIZE? WHY NOT DO BOTH [MICROCOMPUTERS]
HS-026 468

CVCC
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

CYCLES
ENGINES AND CYCLES AIM FOR EFFICIENCY
HS-026 622

DALLAS
NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

DAMAGE
TRANSIT DAMAGE: TROUBLE ALONG THE WAY
HS-026 556

DAMAGED
THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

THE DAMAGED WHEEL SHOULD BE REPLACED
HS-026 499

DASH
ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS
HS-026 536

DB
AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

DC
AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

DEALER
TIRE TECHNOLOGY FOR THE TIRE DEALER
HS-026 541

DEATHS
SHARP INCREASE IN DEATHS, NHTSA ADMINISTRATOR SAYS
HS-026 432

TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

DECISION

COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE
HS-026 501

DEGREE

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

DELINEATION

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

DENVER

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

DEPARTMENT

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

DEPOSIT

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

DEPTH

THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

DEPTHS

AUTO REPAIR: PROBING THE DEPTHS
HS-026 600

DESIGN

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

DESIGNING

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

DETROIT

FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA
HS-026 506

DEVICE

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

DIAGNOSTIC

HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT
HS-805 242

DIESEL

AIR-TO-AIR HEAT EXCHANGERS USED FOR DIESEL INTERCOOLING
HS-026 539

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534

OPTIMIZATION OF DIESEL COMBUSTION RESEARCH
HS-026 431

DIET

THE ENGINEER'S DIET. PT. 1
HS-026 526

DIGITAL

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

DILEMMA

SYMPOSIUM "THE TRAFFIC DILEMMA." PROJECT REPORT
HS-026 478

DISCONTINUING

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A

BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

DISPLAY

ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS
HS-026 536

DIVISION

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

DOAS

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

DOE

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

DOLLARS

WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

DRINKING

COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE
HS-026 501

MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS
HS-026 619

DRIVER

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]
HS-026 495

DRIVERS

THE ROLE OF DRIVERS' VISION IN ROAD SAFETY
HS-026 615

DRIVING

DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

DRUNK DRIVING COSTS, MORE THAN YOU MIGHT FIGURE
HS-026 500

MARIHUANA AND DRIVING HAZARDS
HS-026 456

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

DROP

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

DRUGS

DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

DRUNK

DRUNK DRIVING COSTS, MORE THAN YOU MIGHT FIGURE
HS-026 500

DURATION

TORCH IGNITION SHORTENS COMBUSTION DURATION
HS-026 538

DUTY

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

DYNAMIC

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

DYNAMOMETER

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

ECONOMY

DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT
HS-805 245

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

EDUCATION
ISN'T IT TIME? [MOTORCYCLE RIDER EDUCATION]
HS-026 551

TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

EDUCATIONAL
CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

EFFICIENCY
AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

ENGINES AND CYCLES AIM FOR EFFICIENCY
HS-026 622

POWERPLANT EFFICIENCY PROJECTED VIA LEARNING CURVES
HS-026 535

ELDERLY
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES
HS-026 517

ELECTRIC
YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

ELECTRONIC
ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

APPLICATION OF ELECTRONIC SYSTEMS AT FORD
HS-026 473

AUTOMOTIVE ELECTRONIC SYSTEMS
HS-026 462

EMERGENCY
EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

EMISSION
1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

EMISSIONS
DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534

HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532

EMPIRICAL
ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

EMS
EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

ENERGY
ENERGY CONSERVATION IN TRANSPORTATION
HS-026 527

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

ENFORCEMENT
ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRAT-

ED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

ENGINE

A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4
HS-026 509

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

ENGINEER

THE ENGINEER'S DIET. PT. 1
HS-026 526

ENGINES

ENGINES AND CYCLES AIM FOR EFFICIENCY
HS-026 622

ENVIRONMENTAL

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

EPA

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

EQUIPMENT

A BASIC GUIDE TO HANDICAP EQUIPMENT FOR USE ON SCHOOL BUSES
HS-026 494

ESTABLISHING

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

EUROPEAN

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

EVALUATION

AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 433

GENERAL EVALUATION OF TRAFFIC ACCIDENT COUNTERMEASURES
HS-026 481

ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

EXCELLENCE

EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE
HS-026 599

EXCHANGERS

AIR-TO-AIR HEAT EXCHANGERS USED FOR DIESEL INTERCOOLING
HS-026 539

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

EXECUTIVE

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. EXECUTIVE SUMMARY
HS-026 531

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

EXHAUST

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

EXOTIC

EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE
HS-026 599

EXPANSION

NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

EXPOSURE

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

EXTERNAL

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

FABRICATION

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

FABRICS

IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

FACILITIES

A BICYCLE ACTIVIST LOOKS AT FACILITIES
HS-026 457

FOCUS ON FACILITIES. SOME CURRENT THINKING ON "WHERE WE ARE" AND "WHERE ARE WE GOING?" [BICYCLING]
HS-026 446

FACILITY

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

FAILURE

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

FALL

FUN-FLAT TIRES DUE OUT THIS FALL
HS-026 507

FAMILIES

1,849 FAMILIES REPORT THEIR AUTO CRASH EXPERIENCE
HS-026 553

FAMILY

THE END OF THE FAMILY CAR?
HS-026 524

FASHION

FASHION AND TRANSPORTATION
HS-026 480

FATAL

FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN
HS-026 445

FAULT

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

FEDERAL

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

FEDS

FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA
HS-026 506

FERROUS

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

FIBER

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

FIGURE

DRUNK DRIVING COSTS, MORE THAN YOU MIGHT FIGURE
HS-026 500

FILTER

FILTER SERVICE
HS-026 522

FINANCING

HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT
HS-805 242

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

FIRE

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

FIT

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

FLAME

IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

FLAT

FUN-FLAT TIRES DUE OUT THIS FALL
HS-026 507

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

FLOW

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

FLOWS

THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

FLUIDITY

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

FMVSS

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

FOCUS

FOCUS ON FACILITIES. SOME CURRENT THINKING ON "WHERE WE ARE" AND "WHERE ARE WE GOING?" [BICYCLING]
HS-026 446

FORCE

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

FORD

APPLICATION OF ELECTRONIC SYSTEMS AT FORD
HS-026 473

FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

FRAME

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

FREE

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

FREEWAY

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

FREIGHT

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

FREQUENCY

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

FRICTION

AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

FRONTAL

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

FUEL

ALCOHOL FUEL: THE GREAT CLEAR HOPE
HS-026 484

AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT
HS-805 245

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

FUELS

AUTOMOTIVE FUELS--OUTLOOK FOR THE FUTURE
HS-026 505

THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441

THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

FUN

FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

FUN-FLAT TIRES DUE OUT THIS FALL
HS-026 507

FUNCTION

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

FURY

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

GAS

NO MORE GAS TANKS??
HS-026 523

PROPANE: LOGICAL GAS ALTERNATIVE?
HS-026 614

GASOHOL

GASOHOL TEST PROGRAM
HS-026 453

GASOLINE

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

WHERE DID ALL THE GASOLINE GO?
HS-026 503

GATEWAY

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

GEAR

DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

GEOMETRIC

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

GETAWAY

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

GLASS

"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]
HS-026 491

GOOD

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]
HS-026 598

GOVERNMENT

ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES
HS-026 517

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

GRAPHITE

DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

GUIDANCE

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

GUIDE

A BASIC GUIDE TO HANDICAP EQUIPMENT FOR USE ON SCHOOL BUSES
HS-026 494

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES
HS-026 627

GUIDELINES

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

HAMPSHIRE

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

HANDBOOK

HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT
HS-805 242

HANDICAP

A BASIC GUIDE TO HANDICAP EQUIPMENT FOR USE ON SCHOOL BUSES
HS-026 494

HANDICAPPED

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES
HS-026 517

SAFETY COMES FIRST WHEN TRANSPORTING THE HANDICAPPED
HS-026 493

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]
HS-026 495

HANDLING

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY
HS-805 045

HARNESSES

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY
HS-804 730

HAVING

SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

HAZARD

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

HAZARDOUS

HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS
HS-026 436

HAZARDS

MARIHUANA AND DRIVING HAZARDS
HS-026 456

HEARINGS

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

HEAT

AIR-TO-AIR HEAT EXCHANGERS USED FOR DIESEL INTERCOOLING
HS-026 539

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

HEATER

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

HEIGHT

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

HELMET

MOTORCYCLE HELMET USE. ISSUE PAPER, REV.
HS-803 857

HELMETS

STAYING AHEAD WITH [BICYCLE] HELMETS
HS-026 497

HIGHWAY

CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS
HS-026 436

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-TRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978
HS-026 549

HIGHWAY STATISTICS 1977
HS-026 449

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

VIOLENCE ON THE HIGHWAY
HS-026 601

1979 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT
HS-805 165

HIGHWAYS

THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

HONDA

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

HOPE

ALCOHOL FUEL: THE GREAT CLEAR HOPE
HS-026 484

HUMAN

A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?
HS-026 566

HYBRID

HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

IATSS

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

IC

AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK
HS-026 470

ICE

MODEL ICE CREAM TRUCK ORDINANCE
HS-804 829

IDAHO

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

IDEA

FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA
HS-026 506

IDENTIFICATION

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

IGNITION

IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

TORCH IGNITION SHORTENS COMBUSTION DURATION
HS-026 538

ILLINOIS

ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

IMPACT

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2. FINAL TECHNICAL REPORT
HS-805 245

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

THE IMPACT OF THE SMALL CAR
HS-026 540

IMPACTS

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

IMPLICATIONS

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

IMPRISONED

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

IMPROVEMENT

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

INCENTIVES

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

INCHES

U.S. TRANSPORTATION INCHES INTO METRIC
HS-026 563

INCIDENT

GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

INCREASE

EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 433

SHARP INCREASE IN DEATHS, NHTSA ADMINISTRATOR SAYS
HS-026 432

INDIANA

TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

INDUCED

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

INDUSTRY

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT
HS-805 245

INFANT

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY
HS-804 729

INFANTS

EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 433

INFORMAL

AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

INFORMATION

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

INHAFTIERTE

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

INJECTION

DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534

INJURIES

AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

INJURY

ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

INPUT

PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

INPUTS

ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS
HS-026 536

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

INSPECTION

AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT
HS-805 242

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

INSTALLATION

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

INSTITUTIONS

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

INSTRUMENTATION

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

INSURANCE

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

INTAKE

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

INTEGRATED

AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK
HS-026 470

CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

INTERCOOLING

AIR-TO-AIR HEAT EXCHANGERS USED FOR DIESEL INTERCOOLING
HS-026 539

INTERFACING

INTERFACING TO THE MICROPROCESSOR
HS-026 464

INTERIM

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT
HS-026 618

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

INTERIOR

IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

INTERNATIONAL

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

INTERVIEW

THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN
HS-026 620

INVESTIGATION

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

INVESTIGATIONS

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

INVOLVEMENT

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

IOWA

IOWA MOTORCYCLE CRASH STUDY 1974-1976
HS-026 626

ISN

ISN'T IT TIME? [MOTORCYCLE RIDER EDUCATION]
HS-026 551

ISSUE

EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

MOTORCYCLE HELMET USE. ISSUE PAPER, REV.
HS-803 857

ISSUES

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

JOHN

THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN
HS-026 620

JOURNAL

A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

JUAN

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

JUDICIAL

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

KANSAS

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

KEYNOTE

KEYNOTE ADDRESS [TRAFFIC NOISE]
HS-026 568

KNOWLEDGE

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

LAST

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

LAUNCH

FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA
HS-026 506

LAWS

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS
HS-026 619

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

LEARN

CANADIANS LEARN TO LIVE WITH SEAT BELTS
HS-026 430

THE NEAR-ACCIDENT. LEARN FROM YOUR MISTAKES--PLEASE
HS-026 557

LEARNING

POWERPLANT EFFICIENCY PROJECTED VIA LEARNING CURVES
HS-026 535

LEFT

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

LEGAL

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

LICENSE

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

LICENSING

IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 152

LIGHT

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

LIGHTER

CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

LIGHTS

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

LIMIT

KEEP 55 ALIVE [NATIONAL SPEED LIMIT]
HS-026 606

LINE

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

LITERATURE

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

LITTLETON

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

LIVE

CANADIANS LEARN TO LIVE WITH SEAT BELTS
HS-026 430

LOCAL

ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES
HS-026 517

LOCATIONS

A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT
HS-026 618

LOGICAL

PROPANE: LOGICAL GAS ALTERNATIVE?
HS-026 614

LONG

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

LOOKING

"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]
HS-026 491

LOOKS

A BICYCLE ACTIVIST LOOKS AT FACILITIES
HS-026 457

LOTS

SPARKING PLOTS [PARKING LOTS]
HS-026 558

WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

LOUIS

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-TRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

LOUISIANA

LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

LOW

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

LOWERED

MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS
HS-026 619

LUBRICANT

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

LUBRICANTS

DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

LUBRICATING

A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

LUBRICATION

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

LUXURY

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

MAINTENANCE

MAINTENANCE OF CRASH2 PROGRAM. FINAL REPORT
HS-805 235

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

TIME FOR CHAIN MAINTENANCE [MOTORCYCLES]
HS-026 552

MAKERS

CAR MAKERS. WHERE THEY'LL TAKE US TOMORROW
HS-026 543

MAKES

WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

MAN

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

MANIFOLD

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

MANIFOLDS

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

MARIHUANA

MARIHUANA AND DRIVING HAZARDS
HS-026 456

MARKET

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

MATERIALS

AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT
HS-804 745

MATERIALS CHANGES AFFECT COOLING SYSTEM PERFORMANCE
HS-026 537

MAXIMIZE

DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534

MEASUREMENT

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

MEASUREMENTS

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

MEDIAN

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-TRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

MEDICAL
EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

MELVIN
THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN
HS-026 620

METAL
CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

METHOD
A METHOD OF SAVING MONEY [CAR-POOLING]
HS-026 612

DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

METHODOLOGY
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

METRIC
U.S. TRANSPORTATION INCHES INTO METRIC
HS-026 563

MICHIGAN
AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441

MICROCOMPUTER
A SINGLE CHIP MICROCOMPUTER WITH SYSTEM FEATURES
HS-026 474

MICROCOMPUTER--SIMPLIFYING SOPHISTICATION
HS-026 476

MICROCOMPUTERS
STANDARDIZE OR CUSTOMIZE? WHY NOT DO BOTH [MICROCOMPUTERS]
HS-026 468

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

MICROPROCESSOR
INTERFACING TO THE MICROPROCESSOR
HS-026 464

MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

MICROPROCESSORS
INTRODUCTION TO MICROPROCESSORS
HS-026 463

MIGHT
DRUNK DRIVING COSTS, MORE THAN YOU MIGHT FIGURE
HS-026 500

MINIMIZE
DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534

MIRRORS
"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]
HS-026 491

MISAPPLICATION
MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

MISSOURI
HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

MISTAKES
THE NEAR-ACCIDENT. LEARN FROM YOUR MISTAKES--PLEASE
HS-026 557

MIXTURE
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

MOBILITY
THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

MODEL
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING

SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

MODEL ICE CREAM TRUCK ORDINANCE
HS-804 829

PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

MODIFICATION

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

MONEY

A METHOD OF SAVING MONEY [CAR-POOLING]
HS-026 612

MONITORING

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

MOPEDS

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

MOPEDS: THE 200MPG ALTERNATIVE
HS-026 498

MOS

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

MOTION

THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

MOTOR

AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN
HS-026 445

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

MOTORCYCLE

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

IOWA MOTORCYCLE CRASH STUDY 1974-1976
HS-026 626

ISN'T IT TIME? [MOTORCYCLE RIDER EDUCATION]
HS-026 551

MOTORCYCLE HELMET USE. ISSUE PAPER, REV.
HS-803 857

THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

MOTORCYCLES

THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

TIME FOR CHAIN MAINTENANCE [MOTORCYCLES]
HS-026 552

MOTORCYCLIST

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 152

MOTORIST

OFFICIAL WATCHDOG...A MOTORIST'S BEST FRIEND?
HS-026 544

MOTORS

WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]
HS-026 598

MOTORWAY

VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78
HS-026 492

MPG

FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

MOPEDS: THE 200MPG ALTERNATIVE
HS-026 498

MPH

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

MULTIDISCIPLINARY

A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT
HS-026 618

MULTIGRADE

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

NATIONAL

ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

KEEP 55 ALIVE [NATIONAL SPEED LIMIT]
HS-026 606

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT
HS-805 227

NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. FINAL REPORT
HS-026 530

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. EXECUTIVE SUMMARY
HS-026 531

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

NCAP

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

NEISS

ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

NETWORKS

HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

NEWS

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

NHTSA

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

SHARP INCREASE IN DEATHS, NHTSA ADMINISTRATOR SAYS
HS-026 432

NITROGEN

HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532

NOISE

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

AN AUTOMOBILE NOISE ANNOYANCE PROBLEM
HS-026 623

KEYNOTE ADDRESS [TRAFFIC NOISE]
HS-026 568

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

NOTTINGHAMSHIRE

VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78
HS-026 492

NOX

HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532

NUMBER

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

OBJECTS

HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS
HS-026 436

OBSOLETE

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

OCCUPANT

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

OCTANE
1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

ODOR
DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

OFFENCES
AN AGE ANALYSIS OF TRAFFIC ACCIDENTS AND OFFENCES
HS-026 443

OFFENDERS
DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

OFFER
FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

OFFICIALS
LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

OHIO
AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

OIL
A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4
HS-026 509

OILS
INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

ONCE
YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

OPERATION
AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

OPTIMIZATION
HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

OPTIMIZATION OF DIESEL COMBUSTION RESEARCH
HS-026 431

OPTIONS
HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT
HS-805 242

ORDINANCE
MODEL ICE CREAM TRUCK ORDINANCE
HS-804 829

ORIENTED
DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

OUTAGE
IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

OVERTURN
HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

OXIDATION
DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

OXIDE
CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

OXIDES
HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532

PAINT
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNC-

TION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

PANELS

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

PAPER

EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

MOTORCYCLE HELMET USE. ISSUE PAPER, REV.
HS-803 857

PARKING

SPARKING PLOTS [PARKING LOTS]
HS-026 558

PARTS

NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

PASSENGER

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

PASSIVE

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

PAVED

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

PEDESTRIAN

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

PEDESTRIANS

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

PENETRATION

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978
HS-026 549

PERCEPTION

THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

PERCEPTIONS

1979 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT
HS-805 165

PERFORMANCE

A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

MATERIALS CHANGES AFFECT COOLING SYSTEM PERFORMANCE
HS-026 537

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4
HS-026 509

PERILOUS

EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE
HS-026 599

PERIODIC

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

PERMIT
LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

PERTAINING
STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

PEUGEOT
RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

PICTURE
THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN
HS-026 620

PIGMENT
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

PLAN
ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

PLASTIC
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

PLEASE
THE NEAR-ACCIDENT. LEARN FROM YOUR MISTAKES--PLEASE
HS-026 557

PLOTS
SPARKING PLOTS [PARKING LOTS]
HS-026 558

PLYMOUTH
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

POLES
COLLISIONS WITH UTILITY POLES
HS-026 447

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

POLICE
ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 254

POLICIES
METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. FINAL REPORT
HS-026 530

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. EXECUTIVE SUMMARY
HS-026 531

POLYMER
INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

POOLING
A METHOD OF SAVING MONEY [CAR-POOLING]
HS-026 612

POOR
MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

POWER
POWER STEERING SYSTEM VARIES ASSISTANCE WITH SPEED
HS-026 533

POWERPLANT
POWERPLANT EFFICIENCY PROJECTED VIA LEARNING CURVES
HS-026 535

PRAISE
LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

PRELIMINARY
STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

PREVENTING
TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

PRIVATE
NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

PROBING
AUTO REPAIR: PROBING THE DEPTHS
HS-026 600

PROBLEM

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

AN AUTOMOBILE NOISE ANNOYANCE PROBLEM
HS-026 623

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

PROBLEMORIENTIERTES

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

PROBLEMS

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

PROCEDURE

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

PROCEDURES

PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

PROCEEDINGS

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

PROCUREMENT

AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

PROFESSIONAL

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

PROJECT

AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
HS-026 562

CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 83

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS PROJECT REPORT
HS-026 47

IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 15

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 79

SYMPOSIUM "THE TRAFFIC DILEMMA." PROJECT REPORT
HS-026 47

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 47

PROJECTED

POWERPLANT EFFICIENCY PROJECTED VIA LEARNING CURVES
HS-026 53

PROPANE

PROPANE: LOGICAL GAS ALTERNATIVE?
HS-026 61

PROPERTIES

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 51

PROTECTION

AMA [AMERICAN MOTORCYCLIST ASSOCIATION VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 52

EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 43

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 54

PROVIDE

ON-BOARD COMPUTERS MAY PROVIDE DASH DISPLAY INPUTS
HS-026 53

PRP

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3 PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 14

PSYCHOPHYSICAL

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 54

PUBLIC
DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438
DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439
LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487
METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617
THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441
1979 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT
HS-805 165

PUBLICATION
RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251
RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252
RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

PUBLISHED
TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES
HS-026 627

PUERTO
SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

PURSUIT
EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE
HS-026 599

QUALITY
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

QUESTIONS
COURT DECISION ANSWERS QUESTIONS ON DRINKING AGE
HS-026 501

RADAR
POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 254

RADIATORS
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

RADIO
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

RAM
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

RANDOM
AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

RATE
DIESEL INJECTION RATE CAN MINIMIZE EMISSIONS, MAXIMIZE ECONOMY
HS-026 534
HOW DOES COMBUSTION RATE AFFECT NOX [NITROGEN OXIDES] EMISSIONS?
HS-026 532
IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

RATES
GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

RATIO
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

REAR
BASIC RESEARCH ON REAR-END COLLISIONS
HS-026 482

REBUILDING
THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

RECONSIDERING
MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS
HS-026 619

RECREATIONAL
WHAT YOU SHOULD KNOW ABOUT AUXILIARY TANKS [RECREATIONAL VEHICLES]
HS-026 483

RECYCLING
AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

REDUCED
USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

REGULATIONS
STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

REGULATORS
TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

REGULATORY
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

REINFORCED
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

RELATIONSHIP
THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4
HS-026 509

RELATIVE
NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

RELEVANCE
THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

RELIABLE
DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 254

RENAULT
RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RENEWAL
PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

REPAIR
AUTO REPAIR: PROBING THE DEPTHS
HS-026 600

REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

REPLACED
THE DAMAGED WHEEL SHOULD BE REPLACED
HS-026 499

REQUIREMENTS
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

RESEARCH
AUTOMOBILE INJURIES AND COMPENSATION: THE AIRAC [ALL-INDUSTRY RESEARCH ADVISORY COMMITTEE] STUDY
HS-026 554

BASIC RESEARCH ON REAR-END COLLISIONS
HS-026 482

DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

OPTIMIZATION OF DIESEL COMBUSTION RESEARCH
HS-026 431

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]
HS-026 611

RESISTANCE

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

RESPONDS

CLAYBROOK RESPONDS TO THE AIR BAG CRITICS
HS-026 621

RESPONSE

A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?
HS-026 566

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

RESTORATIVE

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

RESTRAINT

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

THE CHILD RESTRAINT PICTURE. AN INTERVIEW WITH JOHN W. MELVIN
HS-026 620

RESTRAINTS

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY
HS-804 729

RESTRICTIONS

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

RESULTS

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

RETARDANT

IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

RETESTING

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

RETURN

NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

REVIEW

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

RIDE

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

RIDER

ISN'T IT TIME? [MOTORCYCLE RIDER EDUCATION]
HS-026 551

RIG

A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

RIGHT

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RIPPED

HOW TO AVOID GETTING RIPPED-OFF: BRAKES
HS-026 559

RIPPLE

SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

RISK

EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

RISKS

TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

ROAD

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

THE ROLE OF DRIVERS' VISION IN ROAD SAFETY
HS-026 615

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

ROADS

THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

ROADSIDE

HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS
HS-026 436

ROADWAY

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

ROLES

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

ROSS

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

ROUTE

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

RSV

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

RUBBER

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

RULE

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

SAFE

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

SALES

SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

SAVING

A METHOD OF SAVING MONEY [CAR-POOLING]
HS-026 612

SCHOOL

A BASIC GUIDE TO HANDICAP EQUIPMENT FOR USE ON SCHOOL BUSES
HS-026 494

SCIENCE

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

SCIENCES

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

SEARCH

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

SEAT

CANADIANS LEARN TO LIVE WITH SEAT BELTS
HS-026 430

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

SECTOR

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

SELECTION

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

SEMICONDUCTOR

CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

SEMITRAILER

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

SENSE

WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

SERVICE

FILTER SERVICE
HS-026 522

GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978
HS-026 561

SERVICES

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER
HS-803 826

SETS

PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

SEVERELY

THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

SEVERITY

NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT
HS-805 227

SHARP

SHARP INCREASE IN DEATHS, NHTSA ADMINISTRATOR SAYS
HS-026 432

SHEAR

A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

SHOCK

FIT SHOCK ABSORBERS TO YOUR CUSTOMERS NEEDS. A GUIDE TO SHOCK SELECTION AND INSTALLATION
HS-026 460

SHORTENS

TORCH IGNITION SHORTENS COMBUSTION DURATION
HS-026 538

SHOULDER

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY
HS-804 730

SIDE

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH

SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

SIMPLIFYING
MICROCOMPUTER--SIMPLIFYING SOPHISTICATION
HS-026 476

SINGLE
A SINGLE CHIP MICROCOMPUTER WITH SYSTEM FEATURES
HS-026 474

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

SITUATION
ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

SMALL
SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

THE AMERICANIZATION OF THE SMALL CAR
HS-026 564

THE IMPACT OF THE SMALL CAR
HS-026 540

THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

SMALLER
CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

SMOOTH
SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

SOCIETY
THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY. PROJECT REPORT
HS-026 479

SOFTWARE
DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

SOMETIMES
WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

SOPHISTICATION
MICROCOMPUTER--SIMPLIFYING SOPHISTICATION
HS-026 476

SOURCES
TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES
HS-026 627

SPARKING
SPARKING PLOTS [PARKING LOTS]
HS-026 558

SPECIALISTS
CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

SPEED
FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

KEEP 55 ALIVE [NATIONAL SPEED LIMIT]
HS-026 606

POWER STEERING SYSTEM VARIES ASSISTANCE WITH SPEED
HS-026 533

TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

SPEEDS
VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78
HS-026 492

SPORT
FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

STABILITY
DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY
HS-805 045

STAND
FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

STANDARD
A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?
HS-026 566

STANDARDIZE
STANDARDIZE OR CUSTOMIZE? WHY NOT DO BOTH [MICROCOMPUTERS]
HS-026 468

STANDARDS
BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT

HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT

HS-804 129

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT

HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT

HS-805 245

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT

HS-805 246

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]

HS-026 611

STATES

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT

HS-804 854

MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS

HS-026 619

STATIONWAGON

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978

HS-026 549

STATISTICAL

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT

HS-805 166

TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES

HS-026 627

STATISTICS

HIGHWAY STATISTICS 1977

HS-026 449

NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT

HS-805 227

STATUTORY

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT

HS-026 428

STAYING

STAYING AHEAD WITH [BICYCLE] HELMETS

HS-026 497

STEER

PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]

HS-804 790

STEERING

POWER STEERING SYSTEM VARIES ASSISTANCE WITH SPEED

HS-026 533

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT

HS-805 077

SUBCOMMITTEE

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977

HS-026 625

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978

HS-026 624

SUBCOMPACT

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT

HS-805 077

SUBJECT

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY

HS-804 729

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY

HS-804 730

SUGGESTIONS

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]

HS-026 495

SUPERCAR

FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA

HS-026 506

SURVEILLANCE

ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT

HS-026 442

SURVEY

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT

HS-026 609

1979 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT

HS-805 165

SURVEYS

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

SUSPENSION

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

SWEDISH

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

SYMPOSIUM

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

SYMPOSIUM "THE TRAFFIC DILEMMA." PROJECT REPORT
HS-026 478

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

TAKING

AMA [AMERICAN MOTORCYCLIST ASSOCIATION] VS. EPA [ENVIRONMENTAL PROTECTION AGENCY]: TAKING THE DB TO DC [MOTORCYCLE NOISE]
HS-026 528

TANKS

NO MORE GAS TANKS??
HS-026 523

WHAT YOU SHOULD KNOW ABOUT AUXILIARY TANKS [RECREATIONAL VEHICLES]
HS-026 483

TARGET

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

TASK

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441

TEAM

A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT
HS-026 618

TECHNOLOGY

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

TIRE TECHNOLOGY FOR THE TIRE DEALER
HS-026 541

TEMPERATURE

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

TEST

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

GASOHOL TEST PROGRAM
HS-026 453

INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

TESTING

IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 152

TESTS

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

TEXAS

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS
HS-026 567

TEXTURE

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

THERMAL

DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

THINK

THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

THINKING

FOCUS ON FACILITIES. SOME CURRENT THINKING ON "WHERE WE ARE" AND "WHERE ARE WE GOING?" [BICYCLING]
HS-026 446

TIME

ISN'T IT TIME? [MOTORCYCLE RIDER EDUCATION]
HS-026 551

TIME FOR CHAIN MAINTENANCE [MOTORCYCLES]
HS-026 552

TIRE

AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

TIRE TECHNOLOGY FOR THE TIRE DEALER
HS-026 541

TIRES

FUN-FLAT TIRES DUE OUT THIS FALL
HS-026 507

ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

TOMORROW

BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

CAR MAKERS. WHERE THEY'LL TAKE US TOMORROW
HS-026 543

TORCH

TORCH IGNITION SHORTENS COMBUSTION DURATION
HS-026 538

TRACKED

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

TRACTOR

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMITRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

TRACV

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

TRAFFIC

AN AGE ANALYSIS OF TRAFFIC ACCIDENTS AND OFFENCES
HS-026 443

CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR

OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

GENERAL EVALUATION OF TRAFFIC ACCIDENT COUNTERMEASURES
HS-026 481

HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

KEYNOTE ADDRESS [TRAFFIC NOISE]
HS-026 568

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 254

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

SYMPOSIUM "THE TRAFFIC DILEMMA." PROJECT REPORT
HS-026 478

THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH 1979 [INDIANA HIGHWAYS]
HS-026 616

TRAIL

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

TRAIN

CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

TRAINING

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]
HS-026 495

TRAININGSPROGRAMM

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

TRANSIT

AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441

TRANSIT DAMAGE: TROUBLE ALONG THE WAY
HS-026 556

TRANSPORTATION

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES
HS-026 517

ENERGY CONSERVATION IN TRANSPORTATION
HS-026 527

ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

FASHION AND TRANSPORTATION
HS-026 480

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-

TRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977
HS-026 550

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. FINAL REPORT
HS-026 530

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. EXECUTIVE SUMMARY
HS-026 531

PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

SUGGESTIONS FOR DRIVER TRAINING [TRANSPORTATION OF THE HANDICAPPED CHILD]
HS-026 495

TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES
HS-026 627

U.S. TRANSPORTATION INCHES INTO METRIC
HS-026 563

TRANSPORTING

SAFETY COMES FIRST WHEN TRANSPORTING THE HANDICAPPED
HS-026 493

TRAVEL

CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

TREAD

MISAPPLICATION OF TREAD RUBBER CAUSES POOR BOND LINE ADHESIONS, TIRE FAILURE
HS-026 542

TROUBLE

TRANSIT DAMAGE: TROUBLE ALONG THE WAY
HS-026 556

TRUCK

LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

MODEL ICE CREAM TRUCK ORDINANCE
HS-804 829

TRUCKERS

LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

TRUNK

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

TS

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

UNIFORM

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

UNITED

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

UPDATE

AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

URBAN

HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

US

CAR MAKERS. WHERE THEY'LL TAKE US TOMORROW
HS-026 543

USAGE

SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

USER

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

UTILITY

COLLISIONS WITH UTILITY POLES
HS-026 447

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

UTILIZES

FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

VARIES

POWER STEERING SYSTEM VARIES ASSISTANCE WITH SPEED
HS-026 533

VE

YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

VEHICLE

A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN
HS-026 445

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY
HS-805 045

VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78
HS-026 492

VEHICLES

THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

WHAT YOU SHOULD KNOW ABOUT AUXILIARY TANKS [RECREATIONAL VEHICLES]
HS-026 483

VERIFICATION

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

VERKEHRSSTRAFTATER

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

VIBRATION

A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?
HS-026 566

VIOLENCE

VIOLENCE ON THE HIGHWAY
HS-026 601

VISCOMETER

A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

VISCOSITY

ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4
HS-026 509

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

VISCOUS

AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

VISIBILITY

DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

VISION
THE ROLE OF DRIVERS' VISION IN ROAD SAFETY
HS-026 615

VISUAL
THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

WARNING
SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

WARRANTY
WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

WASHINGTON
SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

WATCHDOG
OFFICIAL WATCHDOG...A MOTORIST'S BEST FRIEND?
HS-026 544

WEAR
VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

WHEEL
THE DAMAGED WHEEL SHOULD BE REPLACED
HS-026 499

WHEELS
IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

WHITE
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

WINS
LOUISIANA'S TRUCK PERMIT SYSTEM WINS PRAISE OF OFFICIALS, TRUCKERS, AND PUBLIC
HS-026 487

WORK
AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK
HS-026 470

WORLD
WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]
HS-026 598

WORSE
CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

YELLOW
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

ZIELGRUPPE
DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

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Author Index

Ackroyd, L. W.
VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78
HS-026 492

Anderson, Carl J.
THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

Anderson, James
IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 152

Athans, Michael
HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

Baczynski, R.
RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

Banks, F. R.
A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

Bartz, W. J.
INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

Bartz, Wilfried J.
VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

Beardmore, P.
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

Beck, Janet
AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

Bedard, Patrick
THE ENGINEER'S DIET. PT. 1
HS-026 526

Beitler, Paula
ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

Bennett, Dean A.
TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS
HS-026 475

Benoit, L. N.
FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

Berenguel, Aurora P.
IOWA MOTORCYCLE CRASH STUDY 1974-1976
HS-026 626

Bettison, M.
VEHICLE SPEEDS ON THE M1 MOTORWAY IN NOTTINGHAMSHIRE--1974-78
HS-026 492

Beverley, Kenneth
THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

Bick, Thomas
TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

Bidwell, Joseph B.
AUTOMOTIVE FUELS--OUTLOOK FOR THE FUTURE
HS-026 505

Blomberg, R. D.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

Bohr, Peter
EXOTIC CARS: IN PERILOUS PURSUIT OF EXCELLENCE
HS-026 599

Bonnett, R. E.
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

Bonsall, Peter W.
A METHOD OF SAVING MONEY [CAR-POOLING]
HS-026 612

Bos, A.
A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

Bowers, Jan
VIOLENCE ON THE HIGHWAY
HS-026 601

Bowman, Brian L.
DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

Brandt, Debra L.
IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

pages tightly bound

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Brinkman, C. P.
HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS–HIGHLIGHTS
HS-026 436

Bunch, Howard M.
THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441

Burck, Charles G.
WHAT'S GOOD FOR THE WORLD SHOULD BE GOOD FOR G.M. [GENERAL MOTORS' NEW COMPACT CARS]
HS-026 598

Carlson, Lloyd E.
SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT
HS-805 246

Carter, Elizabeth P , comp.
TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES
HS-026 627

Chandler, R. F.
SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

Chang, H.
IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

Cole, David G.
AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
HS-026 562

Cropper, R.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

Crounse, Kenneth S.
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

Curry, David T.
UNDERSTANDING ANTITRUST CHEMISTRY
HS-026 597

Curtiss, H. C. , Jr.
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

Cutler, Delores A.
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT
HS-026 428

Cynader, Max
THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

Cynecki, Michael J.
DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

Datta, Tapan K.
DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
HS-026 439

Davis, S.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH

SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

Davison, P. A.
THE ROLE OF DRIVERS' VISION IN ROAD SAFETY
HS-026 615

De Rooij, J. C. E. D.
A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

Della-Giustina, Daniel E.
TRAFFIC SAFETY EDUCATION. A GUIDE TO PREVENTING HIGHWAY DEATHS
HS-026 452

DeFrancesco, Henry F.
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

Donelson, Alan C.
DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

Dreger, Donald R.
SMOOTH, RIPPLE-FREE PLASTIC PANELS [AUTOMOBILE BODIES]
HS-026 502

Dries, James L.
AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

Du Parquet, J.
ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

Durbetaki, P.
IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

Eder, Leslie
HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT
HS-805 242

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT
HS-805 243

Edwards, H. Lynn
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

English, John W.
STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

Essell, Debbie
THE IMPACT OF THE SMALL CAR
HS-026 540

Estes, Bill
PROPANE: LOGICAL GAS ALTERNATIVE?
HS-026 614

Finney, Shan
THERE'S A FIRE ENGINE IN MY TRUNK! [CLEARING THE ROAD FOR EMERGENCY VEHICLES]
HS-026 486

Fitzpatrick, M.
RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT
HS-805 262

Flora, Jairus D. , Jr.
ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

Flynn, Lois , comp.
CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY
HS-804 729

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY
HS-804 730

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY
HS-805 045

Folkes, Don
MICROCOMPUTER--SIMPLIFYING SOPHISTICATION
HS-026 476

Ford, Jack L.
IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 152

Fox, J. C.
COLLISIONS WITH UTILITY POLES
HS-026 447

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

Frailey, Fred
CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

Frey, Peter
USED CARS
HS-026 496

Gershwin, Stanley B.
HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

Ghirla, Peter J.
AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

Giangualano, Nicholas F.
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

Godet, A.
ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

Goldspiel, Stephen
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

Good, M. C.
COLLISIONS WITH UTILITY POLES
HS-026 447
COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

Gordon, Donald A.
THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

Green, P. G.
CANADIANS LEARN TO LIVE WITH SEAT BELTS
HS-026 430

Guenthner, R. P.
TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

Gunkel, R. W.
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

Halachmi, Arie
PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

Hale, A.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

Hamilton, Kathy
FUN-FLAT TIRES DUE OUT THIS FALL
HS-026 507
MOPEDS: THE 200MPG ALTERNATIVE
HS-026 498

Hamilton, Russ
CAR MAKERS. WHERE THEY'LL TAKE US TOMORROW
HS-026 543

Hampton, Bill
TIME FOR CHAIN MAINTENANCE [MOTORCYCLES]
HS-026 552

Hilado, Carlos J.
IGNITION CHARACTERISTICS OF SOME AIRCRAFT INTERIOR FABRICS
HS-026 520

Hirano, Hideaki
FASHION AND TRANSPORTATION
HS-026 480

Hodges, Paula D.
FEDS, DETROIT LAUNCH ADAMS' SUPERCAR IDEA
HS-026 506

Hohenemser, Christoph
TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

Howett, Gerald L.
SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS
HS-026 548

Humann, Kingdon
SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

Hunter, William W.
AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
HS-026 562
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

Jarvis, Walt
STAYING AHEAD WITH [BICYCLE] HELMETS
HS-026 497

Johlnke, A. K.
AN AGE ANALYSIS OF TRAFFIC ACCIDENTS AND OFFENCES
HS-026 443

Johnson, John C.
AN AUTOMOBILE NOISE ANNOYANCE PROBLEM
HS-026 623

Johnson, N.
RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT
HS-805 251
RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH

SAFETY VEHICLE]., 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.
HS-805 252

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT
HS-805 250

Jones, Gary T.
RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER
HS-026 603

Jones, Ralph K.
DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

Joscelyn, Kent B.
DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

Joubert, P. N.
COLLISIONS WITH UTILITY POLES
HS-026 447

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

Judge, John F.
NO MORE GAS TANKS??
HS-026 523

THE END OF THE FAMILY CAR?
HS-026 524

Kaiser, Robert
AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT
HS-804 745

Kakumoto, Ryohei
GENERAL EVALUATION OF TRAFFIC ACCIDENT COUNTERMEASURES
HS-026 481

Kaplan, Richard J.
ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
HS-026 442

Karawanny, P.
NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

Kates, Robert
TARGET: HIGHWAY RISKS. 2. THE GOVERNMENT REGULATORS
HS-026 454

Keller, Lawrence F.
PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

Kerr, Salena K.
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

Khadilkar, Anil V.
SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT
HS-805 077

Kirby, William
PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

Klebel, E.
DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

Knapp, Sue F.
COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT
HS-026 429

Knepper, Mike
FUEL-CRISIS FUN. FIVE SPORT COUPES THAT OFFER ALL THE FUN YOU CAN STAND AT 20 MPG
HS-026 461

Knight, R.
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

Kordi, Ilja
ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

Kulik, S.
A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

Kulkarni, H.
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

Laananen, D. H.
SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

Lamure, Claude
KEYNOTE ADDRESS [TRAFFIC NOISE]
HS-026 568

Lawrence, Richard
GASOHOL TEST PROGRAM
HS-026 453

Leet, Duane G.
PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

Leggett, Elizabeth C.
AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
HS-026 562

Lehman, Josh
FOCUS ON FACILITIES. SOME CURRENT THINKING ON "WHERE WE ARE" AND "WHERE ARE WE GOING?" [BICYCLING]
HS-026 446

Leszczynski, S. A.
FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

Lim, G.
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

Lindley, Jeffrey A.
GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

Logan, A. B.
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

Lowery, M.
NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

Luce, Robert L.
AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK
HS-026 470

Luhrs, R. A.
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

Lund, Bob
GOOD TO THE LAST DROP [IMPACT OF RESTRICTIONS ON GASOLINE USE ON THE AUTO SERVICE INDUSTRY]
HS-026 521

Lyn, W. T.
OPTIMIZATION OF DIESEL COMBUSTION RESEARCH
HS-026 431

MacDonald, E. C.
CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

MacDonald, H. C.
APPLICATION OF ELECTRONIC SYSTEMS AT FORD
HS-026 473

Maickel, Roger P.
DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
HS-804 774

Mandel, Leon
AUTO REPAIR: PROBING THE DEPTHS
HS-026 600

USED CARS
HS-026 496

Mannering, Fred Laires
METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

Marshall, E. F.
SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

Matson, G. L.
IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

Maxwell, William
CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

Mayer, Caroline
CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

McIntyre, Donald M.
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

McMillan, M. L.
VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

McPhail, Ronald G.
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

Mehisak, Mo
WARRANTY ADMINISTRATION. IT MAKES LOTS OF DOLLARS, BUT SOMETIMES NOT MUCH SENSE
HS-026 555

Merritt, John O.
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

Michalke, H.
DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

Michnal, Jerry A.
STANDARDIZE OR CUSTOMIZE? WHY NOT DO BOTH [MICROCOMPUTERS]
HS-026 468

Miller, B.
NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

Miller, Gene H.
INTERFACING TO THE MICROPROCESSOR
HS-026 464

INTRODUCTION TO MICROPROCESSORS
HS-026 463

Milner, Gerald
MARIHUANA AND DRIVING HAZARDS
HS-026 456

Miyakawa, Hiroshi
THE IATSS [INTERNATIONAL ASSOCIATION OF TRAFFIC AND SAFETY SCIENCES] SYMPOSIUM ON TRAFFIC SCIENCE 1978: MOBILITY FOR MAN AND SOCIETY, PROJECT REPORT
HS-026 479

Morita, Takashi
SYMPOSIUM "THE TRAFFIC DILEMMA." PROJECT REPORT
HS-026 478

Morris, Dennis
CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET
HS-026 467

Motwani, M. B.
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

Murphy, C. K.
VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

Nagamachi, Mitsuo
CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

Nagaoka, Toshisada
CONCEPTION OF ESTABLISHING EDUCATIONAL INSTITUTIONS TO TRAIN TRAFFIC SPECIALISTS. PROJECT REPORT
HS-026 477

Nedbal, Richard A.
A SINGLE CHIP MICROCOMPUTER WITH SYSTEM FEATURES
HS-026 474

Nerpel, Chuck
USED CARS
HS-026 496

Nishimura, Takashi
BASIC RESEARCH ON REAR-END COLLISIONS
HS-026 482

O'Connell, Jeffrey
AN UPDATE OF THE SURVEYS ON THE OPERATION OF NO-FAULT AUTO INSURANCE LAWS
HS-026 434

O'Hara, Susan
EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

O'Neill, Brian
SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

Ogren, James R.
A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT
HS-026 618

Palmer, James A.
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

Pearn, J. H.
FATAL MOTOR VEHICLE ACCIDENTS INVOLVING AUSTRALIAN CHILDREN
HS-026 445

Perchonok, K.
HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS
HS-026 436

Pike, W. C.
A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

Pilkington, R. R.
FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

Preusser, D. F.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

Ray, Horace W.
STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

Recard, R.
NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

Regan, David
THE VISUAL PERCEPTION OF MOTION IN DEPTH
HS-026 560

Reisinger, Keith S.
EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 433

Ricci, Leda
NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT
HS-805 227

Rigney, Pete
SMALL CAR ALREADY HAVING EFFECT ON SALES [AUTOMOTIVE PARTS]
HS-026 565

Rochon, James
EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

Romaine, Deborah S.
THINK SMALL: AUTOS VS. MOTORCYCLES [MOTORCYCLE CONSPICUITY]
HS-026 485

Rosenberg, R. C.
VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

Sandberg, Ulf
ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

Sandover, J.
A STANDARD ON HUMAN RESPONSE TO VIBRATION--ONE OF A NEW BREED?
HS-026 566

Schjelderup, Lars
ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

Schmidt, L.
DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)
HS-026 529

Schwab, Richard N.
THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

Scrimgeour, Gary J.
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

Sheets, Kenneth
CHANGES IN THE WAY YOU WILL TRAVEL. CITY TRAFFIC: WORSE BEFORE IT GETS BETTER. CAR OF THE FUTURE: SMALLER, LIGHTER, MORE COSTLY
HS-026 504

Sidwell, D. R.
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

Skrabak, Darryl
A BICYCLE ACTIVIST LOOKS AT FACILITIES
HS-026 457

Smith, R. Kennedy
AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY--VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

Sorton, Alex
BICYCLE FACILITY STANDARDS. DESIGNING FOR TOMORROW WITH OBSOLETE INFORMATION
HS-026 458

Stafford, Fred
USED CARS
HS-026 496

Stafford, G. K.
TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

Stascausky, C. A.
CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

Stutts, Jane C.
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL.

1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-804 854

Sunderland, A. L.
THE BODY BUILDERS [REBUILDING OF SEVERELY DAMAGED CARS]
HS-026 613

Swain, Larry
EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

Sweet, L. M.
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

Takai, Hiroyuki
BASIC RESEARCH ON REAR-END COLLISIONS
HS-026 482

Tan, Han-Ngee
HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT
HS-026 605

Thompson, John
WHAT YOU SHOULD KNOW ABOUT AUXILIARY TANKS [RECREATIONAL VEHICLES]
HS-026 483

Thoms, J. L.
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

Tignor, Samuel C.
GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

Tincher, W. C.
IGNITION CHARACTERISTICS OF FLAME RETARDANT FABRICS
HS-026 519

Tofany, Vincent L.
KEEP 55 ALIVE [NATIONAL SPEED LIMIT]
HS-026 606

Tomerlin, John
WHERE DID ALL THE GASOLINE GO?
HS-026 503

Torczyner, R. D.
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

Tratner, Alan
ALCOHOL FUEL: THE GREAT CLEAR HOPE
HS-026 484

Tuck, Larry
TRANSIT DAMAGE: TROUBLE ALONG THE WAY
HS-026 556

Turner, David A.
YOU'VE COME A LONG WAY, BABY!--ELECTRIC CARS, ONCE THE HEIGHT OF LUXURY ARE ON A DOE [DEPARTMENT OF ENERGY]-PAVED COMEBACK TRAIL
HS-026 525

Ulmer, R. G.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY
HS-805 248

Van Namen, D.
A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

Van Os, N.
A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

Walker, Howard
OFFICIAL WATCHDOG...A MOTORIST'S BEST FRIEND?
HS-026 544

Wallingford, Jerry G.
IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT
HS-805 247

Want, Robert S.
STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

Weber, James W.
PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

Weltman, W. C.
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

Wharton, John
DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

Wiemann, W.
INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

Williams, Allan F.
EVALUATION OF PROGRAMS DESIGNED TO INCREASE THE PROTECTION OF INFANTS IN CARS
HS-026 433

SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

Wilson, Jim
MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

Wintz, Paul A.
MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

Yarkoni, Barry
DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

Yates, Derek
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

Yeaple, Frank
ENGINES AND CYCLES AIM FOR EFFICIENCY
HS-026 622

Yee, R.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 171

Yoakum, Charles
MANY STATES RECONSIDERING LOWERED DRINKING-AGE LAWS
HS-026 619

Zaccari, Stephen
MAINTENANCE OF CRASH2 PROGRAM. FINAL REPORT
HS-805 235

Zaber, Kenneth L.
"THROUGH THE LOOKING GLASS" [ADJUSTMENT OF CAR MIRRORS]
HS-026 491

Corporate Author Index

. T. Kearney, Inc., 699 Prince St., Alexandria, Va. 22313
IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 1, FINAL SUMMARY REPORT
HS-805 244

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY. VOL. 2, FINAL TECHNICAL REPORT
HS-805 245

cheson Industries, Inc.
AUTOMOTIVE ENGINE FRICTION AND FUEL EFFICIENCY–VISCOUS VERSUS NON-VISCOUS EFFECTS
HS-026 515

dvanced Technology Systems, Inc., 2425 Wilson Blvd., rlington, Va. 22201
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

luminum Co. of America
REPAIR OF ALUMINUM HEAT EXCHANGERS [AUTOMOBILE RADIATORS, AIR-CONDITIONER COILS AND MANIFOLDS, HEATER CORES, AND OIL COOLERS]
HS-026 508

American Bar Assoc., Fund for Public Education, 1155 East 60th St., Chicago, Ill. 60637
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

American Microsystems, Inc.
A SINGLE CHIP MICROCOMPUTER WITH SYSTEM FEATURES
HS-026 474

Argos Associates, Inc., 12 Glengarry, Winchester, Mass. 01890
AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT
HS-804 745

Battelle Columbus Labs., 505 King Ave., Columbus, Ohio 43201
STATISTICAL ANALYSIS OF PRELIMINARY DATA FOR THE SAFE PERFORMANCE CURRICULUM DRIVING KNOWLEDGE TEST. INTERIM REPORT
HS-805 166

Biotechnology, Inc., Falls Church, Va.
STATE TRAFFIC REGULATIONS AND LEGAL ISSUES PERTAINING TO VEHICLE HAZARD WARNING LIGHTS
HS-804 595

British Petroleum Co., Ltd., BP Res. Centre, Middlesex, England
A SIMPLE HIGH SHEAR VISCOMETER--ASPECTS OF CORRELATION WITH ENGINE PERFORMANCE
HS-026 513

California Dept. of Motor Vehicles, 2415 First Ave., Sacramento, Calif. 95818
IMPROVED MOTORCYCLIST LICENSING AND TESTING PROJECT. ANNUAL REPORT
HS-805 152

Calspan Field Services Inc.
HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS
HS-026 436

Canadian Facts Ltd., Toronto, Ont., Canada
EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

Congress. House Com. on Public Works and Transportation
SAFETY BELT USAGE. HEARINGS BEFORE THE SUBCOMMITTEE ON INVESTIGATIONS AND REVIEW, SAN JUAN, PUERTO RICO--JANUARY 4, 5, 1978; WASHINGTON, D.C.--JUNE 6, 7, 8, 1978
HS-026 624

Congress. Senate Com. on Commerce, Science, and Transportation
PASSIVE RESTRAINT RULE. HEARINGS BEFORE THE SUBCOMMITTEE FOR CONSUMERS, ON DEPARTMENT OF TRANSPORTATION'S JUNE 30, 1977 PASSIVE RESTRAINT RULE, SEPTEMBER 8, 9, 14, AND 21, 1977
HS-026 625

Coordinating Res. Council, Inc., Fuel Efficient Lubricants Group, 30 Rockefeller Plaza, New York, N.Y. 10020
SURVEY OF LUBRICANT INFLUENCE ON LIGHT-DUTY VEHICLE FUEL ECONOMY. FINAL REPORT
HS-026 609

Coordinating Res. Council, Inc., Intake Manifold Deposit Engine Dynamometer Test Procedure Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
INTAKE MANIFOLD DEPOSIT ENGINE DYNAMOMETER TEST PROCEDURE. STATE-OF-THE-ART SUMMARY REPORT: 1973-1978
HS-026 608

Coordinating Res. Council, Inc., Odor Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
DEVELOPMENT AND EVALUATION OF A METHOD FOR MEASUREMENT OF DIESEL EXHAUST ODOR USING A DIESEL ODOR ANALYSIS SYSTEM (DOAS)
HS-026 607

Coordinating Res. Council, Inc., Thermal Oxidation Test Techniques Panel, 30 Rockefeller Plaza, New York, N.Y. 10020
DEVELOPMENT OF RESEARCH TECHNIQUE FOR THE STUDY OF THERMAL OXIDATION STABILITY OF GEAR LUBRICANTS
HS-026 610

Coordinating Res. Council, Inc., 1977 Altitude Prog. Analysis Panel, 30 Rockefeller Plaza, New York, N.Y. 10020

1977 CRC [COORDINATING RESEARCH COUNCIL] ALTITUDE PROGRAM AUTO EXHAUST EMISSION STANDARDS AND OCTANE REQUIREMENTS]

HS-026 611

Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154

AUTOMOTIVE APPLICATIONS OF COMPOSITE MATERIALS. FINAL REPORT

HS-804 745

Cummins Engine Co.

OPTIMIZATION OF DIESEL COMBUSTION RESEARCH

HS-026 431

Department of Transportation, Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142

ENERGY CONSERVATION IN TRANSPORTATION

HS-026 527

Dunlap and Associates, Inc., 1 Parkland Drive, Darien, Conn. 06820

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. EXECUTIVE SUMMARY

HS-805 248

Dynamic Science, Inc., 1850 Pinnacle Peak Rd., Phoenix, Ariz. 85027

RSV TEST MONITORING AND DATA PUBLICATION--RESULTS OF EUROPEAN PERFORMANCE AND HANDLING TESTS ON THE CALSPAN RSV [RESEARCH SAFETY VEHICLE]. FINAL REPORT

HS-805 250

Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 1: 1975 HONDA CIVIC CVCC-TO-NHTSA TEST DEVICE. FINAL REPORT

HS-805 168

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 4: 1975 PLYMOUTH FURY-TO-NHTSA TEST DEVICE. FINAL REPORT

HS-805 171

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE RIGHT SIDE IMPACT, AT RENAULT. FINAL REPORT

HS-805 251

RSV TEST MONITORING AND DATA PUBLICATION - RENAULT R20TS-TO-CALSPAN RSV [RESEARCH SAFETY VEHICLE], 75 DEGREE LEFT SIDE IMPACT, AT PEUGEOT. FINAL REPORT.

HS-805 252

RESEARCH SAFETY VEHICLE (RSV) CRASH TEST REPORT, TEST NO. 3054-1: 41 MPH FLAT BARRIER FRONTAL IMPACT. FINAL REPORT

HS-805 262

Ecosometrics, Inc., 4715 Cordell Ave., Bethesda, Md. 20014

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. EXECUTIVE SUMMARY. FINAL REPORT

HS-026 427

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. STATUTORY AND REGULATORY ANALYSIS OF INCENTIVES AND BARRIERS TO COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. FINAL REPORT

HS-026 428

COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED. A MODEL UNIFORM BILLING AND ACCOUNTING SYSTEM FOR COORDINATED TRANSPORTATION SYSTEMS. FINAL REPORT

HS-026 429

Environmental Protection Agency, Emission Control Technology Div.

RESTORATIVE MAINTENANCE RETESTING OF 1977 MODEL YEAR PASSENGER CARS IN DENVER

HS-026 603

Environmental Protection Agency, Motor Vehicle Emission Lab., 2565 Plymouth Rd., Ann Arbor, Mich. 48105

GASOHOL TEST PROGRAM

HS-026 453

Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C. 20460

NOISE TECHNOLOGY RESEARCH NEEDS AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT AND THE PRIVATE SECTOR. PROCEEDINGS OF THE EPA NOISE TECHNOLOGY RESEARCH SYMPOSIUM, JANUARY 29-31, 1979, DALLAS, TEXAS

HS-026 567

EGandG Automotive Res., Inc., 5404 Bandera Rd., San Antonio, Tex. 78238

IMPACT RESISTANCE OF NON-FERROUS PASSENGER CAR WHEELS--MODIFICATION NUMBER 2. FINAL REPORT

HS-805 247

Fairchild Camera and Instrument Semiconductor Div.

TECHNIQUES FOR APPLYING SINGLE CHIP MICROCOMPUTERS TO AUTOMOTIVE PROBLEMS

HS-026 475

Federal Aviation Administration, Civil Aeromedical Inst., Okalhoma City, Okla.

SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM

HS-026 490

Federal Hwy. Administration, Environmental Design and Control Div.

HAZARDOUS EFFECTS OF HIGHWAY FEATURES AND ROADSIDE OBJECTS--HIGHLIGHTS

HS-026 436

Federal Hwy. Administration, Hwy. Statistics Div., Washington, D.C. 20590

HIGHWAY STATISTICS 1977

HS-026 449

Federal Hwy. Administration, Implementation Div. (HDV-21), 400 7th St., S.W., Washington, D.C. 20590
USER GUIDELINES FOR REDUCED VISIBILITY GUIDANCE SYSTEM DESIGN. EXECUTIVE SUMMARY
HS-026 518

Federal Hwy. Administration, Office of Res., Washington, D.C. 20590
THE APPLICATION OF VISIBILITY RESEARCH TO ROADS AND HIGHWAYS
HS-026 437

Federal Hwy. Administration, Traffic Systems Div., Washington, D.C. 20590
GETAWAY FLOW RATES FOR FREEWAY INCIDENT AND GEOMETRIC BOTTLENECKS
HS-026 435

Federal Hwy. Administration, Washington, D.C.
SAFETY-RELATED INFORMATION NEEDS. A REPORT TO THE FEDERAL HIGHWAY ADMINISTRATOR FROM THE SAFETY-RELATED INFORMATION NEEDS TASK FORCE
HS-026 546

Ford Motor Co.
GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME
HS-026 450

Ford Motor Co.
DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
HS-026 451

Ford Motor Co., Engineering and Res. Staff, Dearborn, Mich.
APPLICATION OF ELECTRONIC SYSTEMS AT FORD
HS-026 473

Ford Motor Co., Vehicle Controls Engineering, Dearborn, Mich.
FORD SPEED CONTROL UTILIZES I2L TECHNOLOGY
HS-026 472

General Motors Corp.
VISCOSITY EFFECTS ON ENGINE WEAR UNDER HIGH-TEMPERATURE, HIGH-SPEED CONDITIONS
HS-026 514

General Motors Inst., Electrical Engineering, Flint, Mich.
INTRODUCTION TO MICROPROCESSORS
HS-026 463

INTERFACING TO THE MICROPROCESSOR
HS-026 464

General Motors Res. Labs., Executive Dept., Warren, Mich. 48090
AUTOMOTIVE FUELS--OUTLOOK FOR THE FUTURE
HS-026 505

Governor's Hwy. Safety Office, Office for Planning and Programming, Des Moines, Iowa 50319
IOWA MOTORCYCLE CRASH STUDY 1974-1976
HS-026 626

Human Factors Res., Inc., 6780 Cortona Drive, Goleta, Calif. 93017
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

Illinois Dept. of Transportation, Div. of Trafic Safety, Springfield, Ill.
ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

Illinois State Police, Field Operations Office
ILLINOIS TRAFFIC SAFETY PROGRAMS. REPORT OF EVALUATION OR ASSESSMENT. CONCENTRATED TRAFFIC ENFORCEMENT. ILLINOIS STATE POLICE EVALUATION PLAN
HS-026 489

Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47405
COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 128

COMPARATIVE ANALYSIS OF ALCOHOL HIGHWAY SAFETY JUDICIAL STANDARDS AND EXISTING PROFESSIONAL STANDARDS. VOL. 2: ANALYSIS OF STANDARDS AND CODES. FINAL REPORT
HS-804 129

Institut de Recherche des Transports, Centre d'Evaluation et de Recherche des Nuisances, France
KEYNOTE ADDRESS [TRAFFIC NOISE]
HS-026 568

Institut fur Erdolforshung, Germany
INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

Insurance Inst. for Hwy. Safety
SEAT BELT LAWS: IMPLICATIONS FOR OCCUPANT PROTECTION
HS-026 547

Intel Corp.
DESIGNING RELIABLE SOFTWARE FOR AUTOMOTIVE APPLICATIONS
HS-026 466

Kappa Systems, Inc., 1501 Wilson Blvd., Arlington, Va. 22209
NATIONAL PARTS RETURN PROGRAM. VOL. 2: THE EXPANSION STUDY. FINAL REPORT
HS-805 145

THE NATIONAL PARTS RETURN PROGRAM. VOL. 3: PRP NEWS AND PROGRAM INPUTS. FINAL REPORT
HS-805 146

Koninklijke/Shell-Laboratorium, Amsterdam, Netherlands
A STUDY OF LUBRICATING OIL PERFORMANCE IN A JOURNAL BEARING RIG
HS-026 516

Kuratorium fur Verkehrssicherheit, Verkehrspsychologisches Inst., Vienna, Austria

DRIVER IMPROVEMENT. IMPRISONED TRAFFIC OFFENDERS AS A TARGET GROUP FOR A PROBLEM-ORIENTED TRAINING PROGRAM (DRIVER IMPROVEMENT. INHAFTIERTE VERKEHRSSTRAFTATER ALS ZIELGRUPPE FUR EIN PROBLEMORIENTIERTES TRAININGSPROGRAMM)

HS-026 529

Massachusetts Inst. of Tech., Lab. for Information and Decision Systems, Cambridge, Mass. 02139

HYBRID OPTIMIZATION IN URBAN TRAFFIC NETWORKS. FINAL REPORT

HS-026 605

Merlin Technologies, Inc.

GRAPHITE-REINFORCED-PLASTIC PASSENGER CAR FRAME

HS-026 450

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017

SUBCOMPACT VEHICLE ENERGY ABSORBING STEERING COLUMN EVALUATION AND IMPROVEMENT. FINAL REPORT

HS-805 077

Mobility Systems and Equipment Co., 6151 West Century Blvd., Suite 912, Los Angeles, Calif. 90045

SAFETY COMPLIANCE TEST PROGRAM. FMVSS [FEDERAL MOTOR VEHICLE SAFETY STANDARDS] 212, 219, 301-75, NCAP [NEW CAR ASSESSMENT PROGRAM], ACCIDENT INVESTIGATION DIVISION DATA. FINAL REPORT

HS-805 246

Mostek Corp.

MICROCOMPUTER--SIMPLIFYING SOPHISTICATION

HS-026 476

Motorola Inc., Austin, Tex.

STANDARDIZE OR CUSTOMIZE? WHY NOT DO BOTH [MICROCOMPUTERS]

HS-026 468

National Bureau of Standards, Washington, D.C. 20234

SOME PSYCHOPHYSICAL TESTS OF THE CONSPICUITIES OF EMERGENCY VEHICLE WARNING LIGHTS

HS-026 548

National Hwy. Traffic Safety Administration, Office of State Vehicle Programs, Washington, D.C. 20590

HANDBOOK ON FINANCING OPTIONS FOR DIAGNOSTIC INSPECTION PROGRAMS. TECHNICAL REPORT

HS-805 242

IMPACT OF DISCONTINUING IDAHO'S PERIODIC MOTOR VEHICLE INSPECTION PROGRAM (A BEFORE AND AFTER OUTAGE RATE STUDY). TECHNICAL REPORT

HS-805 243

National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washington, D.C. 20590

CHILD AND INFANT RESTRAINTS; A SUBJECT BIBLIOGRAPHY

HS-804 729

National Hwy. Traffic Safety Administration, Technical Reference Branch, Room 5108, 400 7th St., S.W., Washington, D.C. 20590

SHOULDER HARNESSES; A SUBJECT BIBLIOGRAPHY

HS-804 730

National Hwy. Traffic Safety Administration, Technical Reference Branch, Washington, D.C. 20590

VEHICLE HANDLING AND STABILITY; A BIBLIOGRAPHY

HS-805 045

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590

EMERGENCY MEDICAL SERVICES (EMS). COORDINATION AND SYSTEMS IMPROVEMENT. ISSUE PAPER

HS-803 826

MOTORCYCLE HELMET USE. ISSUE PAPER, REV.

HS-803 857

National Hwy. Traffic Safety Administration, Washington, D.C. 20590

MODEL ICE CREAM TRUCK ORDINANCE

HS-804 829

POLICE TRAFFIC RADAR: IS IT RELIABLE?

HS-805 254

National Semiconductor Corp.

AUTOMOTIVE IC'S [INTEGRATED CIRCUITS]--THEY WORK

HS-026 470

National Semiconductor Corp., Santa Clara, Calif.

CUSTOM MOS [METAL OXIDE SEMICONDUCTOR] FOR THE AUTOMOTIVE MARKET

HS-026 467

National Transportation Policy Study Commission, 2000 M St., N.W., Suite 3000, Washington, D.C. 20036

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. FINAL REPORT

HS-026 530

NATIONAL TRANSPORTATION POLICIES THROUGH THE YEAR 2000. EXECUTIVE SUMMARY

HS-026 531

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594

HIGHWAY ACCIDENT REPORT. STATIONWAGON PENETRATION OF BRIDGERAIL, I-10, NEAR ALHAMBRA, CALIFORNIA, NOVEMBER 11, 1978

HS-026 549

HIGHWAY ACCIDENT REPORT. GATEWAY TRANSPORTATION COMPANY, INC., TRACTOR-SEMI-TRAILER PENETRATION OF MEDIAN BARRIER AND COLLISION WITH AUTOMOBILE, I-70, ST. LOUIS, MISSOURI, SEPTEMBER 25, 1977

HS-026 550

HIGHWAY ACCIDENT REPORT. ROSS AMBULANCE SERVICE, AMBULANCE OVERTURN, STATE ROUTE 116, LITTLETON, NEW HAMPSHIRE, AUGUST 22, 1978

HS-026 561

New York State Police, Traffic Section, Public Security Bldg. 22, State Campus, Albany, N.Y. 12226
CITIZEN'S BAND RADIO HIGHWAY SAFETY EVALUATION PROJECT. VOL. 2. FINAL REPORT
HS-804 833

Ohio Legislative Service Commission, State House, Columbus, Ohio
AN EVALUATION OF OHIO'S RANDOM MOTOR VEHICLE INSPECTION PROGRAM
HS-026 488

Pennsylvania State Univ., University Park, Pa.
SEAT/OCCUPANT CRASH DYNAMIC ANALYSIS VERIFICATION TEST PROGRAM
HS-026 490

Princeton Univ., Dept. of Mechanical and Aerospace Engineering, Princeton, N.J. 08540
A COMPARATIVE STUDY OF THE RIDE QUALITY OF TRACV [TRACKED RAM AIR CUSHION VEHICLE] SUSPENSION ALTERNATIVES. INTERIM REPORT
HS-026 628

Public Technology, Inc., 1140 Connecticut Ave., N.W., Washington, D.C. 20036
ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES
HS-026 517

Purdue Univ., Joint Hwy. Res. Proj., West Lafayette, Ind. 47907
TRAFFIC SPEED REPORT NO. 108. INTERIM REPORT, JANUARY-MARCH, 1979 [INDIANA HIGHWAYS]
HS-026 616

METHODOLOGY FOR EVALUATING THE IMPACTS OF ENERGY, NATIONAL ECONOMY, AND PUBLIC POLICIES ON STATE HIGHWAY FINANCING AND PERFORMANCE. FINAL REPORT
HS-026 617

A MULTIDISCIPLINARY TEAM STUDY OF HIGH ACCIDENT LOCATIONS. INTERIM REPORT
HS-026 618

Road Traffic Board of South Australia, Box 19, P.O. Walkerville, S.A. 5081, Australia
AN AGE ANALYSIS OF TRAFFIC ACCIDENTS AND OFFENCES
HS-026 443

Royal Inst. of Tech., Dept. of Hwy. Engineering, Stockholm, Sweden
ENERGY EFFICIENCY IN PASSENGER AND FREIGHT TRANSPORTATION. A COMPARATIVE STUDY OF THE SWEDISH SITUATION
HS-026 596

Smithers Scientific Services, Inc., Akron, Ohio
TIRE TECHNOLOGY FOR THE TIRE DEALER
HS-026 541

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096
THE RELATIONSHIP BETWEEN ENGINE OIL VISCOSITY AND ENGINE PERFORMANCE--PT. 4
HS-026 509

Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096
AUTOMOTIVE ELECTRONIC SYSTEMS
HS-026 462

Sprague Electric Co., Worcester, Mass.
CUSTOM BIPOLAR INTEGRATED CIRCUITS FOR AUTOMOTIVE APPLICATION
HS-026 469

Statens Vag- och Trafikinstitut (VTI), Fack, 58101 Linkoping, Sweden
ROAD TEXTURE INDUCED EXTERNAL TIRE NOISE. EMPIRICAL FREQUENCY RESPONSE FUNCTION FOR TIRES
HS-026 459

Statistics Canada, Information Bank Methodology Section, Ottawa, Ont., Canada
EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

Stewart Warner Electronics
CUSTOM CMOS [COMPLEMENTARY METAL OXIDE SEMICONDUCTOR] APPROACH TO AUTOMOTIVE INSTRUMENTATION
HS-026 471

Systems Technology, Inc., Hawthorne, Calif.
DRIVER'S VISIBILITY REQUIREMENTS FOR ROADWAY DELINEATION. VOL. 2. COLOR IDENTIFICATION OF YELLOW HIGHWAY PAINT AS A FUNCTION OF YELLOW/WHITE PIGMENT MIXTURE RATIO. FINAL REPORT
HS-026 602

Technische Akademie Esslingen, Ostfildern, Germany
INVESTIGATIONS TO CHARACTERIZE THE LOW-TEMPERATURE-FLUIDITY OF POLYMER-CONTAINING ENGINE OILS
HS-026 510

VISCOSITY AND FLOW PROPERTIES OF MULTIGRADE ENGINE OILS--A REVIEW OF AN INTERNATIONAL COLLOQUIUM
HS-026 511

Teknekron Res., Inc., 1483 Chain Bridge Rd., McLean, Va. 22101
1979 SURVEY OF PUBLIC PERCEPTIONS ON HIGHWAY SAFETY. FINAL REPORT
HS-805 165

Transport Canada, Road and Motor Vehicle Traffic Safety Branch, Ottawa, Ont., Canada
EXPOSURE TO THE RISK OF AN ACCIDENT: A REVIEW OF THE LITERATURE, AND THE METHODOLOGY FOR THE CANADIAN STUDY
HS-026 604

TOTAL, Centre de Recherches, France
ASSESSMENT OF LUBRICATION CONDITIONS IN A BIG-END BEARING BY TEMPERATURE MEASUREMENTS--CORRELATION WITH HIGH SHEAR VISCOSITY
HS-026 512

University of California, Berkeley, Inst. of Transportation Studies Library, Berkeley, Calif.
TRANSPORTATION ACCIDENTS: A GUIDE TO PUBLISHED STATISTICAL SOURCES
HS-026 627

University of California, Lawrence Livermore Lab., Livermore, Calif. 94550
THE USE OF ALTERNATIVE FUELS IN HIGHWAY VEHICLES--THE RELEVANCE OF U.S. ENERGY FLOWS
HS-026 455

University of Dayton Res. Inst., 300 College Park, Dayton, Ohio 45469
PROCEDURES USED TO GENERATE INPUT DATA SETS FOR THE ARTICULATED TOTAL BODY MODEL FROM ANTHROPOMETRIC DATA
HS-026 444

University of Kansas, Inst. for Social and Environmental Studies, 607 Blake Hall, Lawrence, Kans. 66045
PROJECT K-STEER. FINAL REPORT [EVALUATION OF KANSAS SYSTEM OF DRIVER LICENSE RENEWAL]
HS-804 790

University of Melbourne, Dept. of Mechanical Engineering, Parkville, Melbourne, Vic. 3052, Australia
COLLISIONS WITH UTILITY POLES
HS-026 447

COLLISIONS WITH UTILITY POLES. SUMMARY REPORT
HS-026 448

University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
ANALYSIS OF THE NEISS [NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM] DATA FOR BICYCLE-ASSOCIATED ACCIDENTS. FINAL REPORT
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NATIONAL CRASH SEVERITY STUDY STATISTICS. SPECIAL REPORT
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DRUGS AND DRIVING: INFORMATION NEEDS AND RESEARCH REQUIREMENTS. FINAL REPORT
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AN INFORMAL STUDY OF TRANSIT BUS TIRE PROCUREMENT AND RECYCLING IN MICHIGAN
HS-026 440

THE POTENTIAL FOR USE OF ALTERNATIVE FUELS IN MICHIGAN'S PUBLIC TRANSIT SYSTEMS. FINAL TASK REPORT
HS-026 441

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AN ANALYSIS OF BICYCLE ACCIDENTS IN NORTH CAROLINA: 1974-1976. PROJECT REPORT
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AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
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DESIGN AND FABRICATION OF AUTOMOTIVE COMPONENTS IN GRAPHITE FIBER REINFORCED COMPOSITES
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DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: TECHNOLOGY ASSESSMENT. FINAL TASK REPORT
HS-026 438

DIGITAL DATA COMMUNICATION FEATURES IN PUBLIC TRANSIT SYSTEMS: EXECUTIVE SUMMARY.
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MAINTENANCE OF CRASH2 PROGRAM. FINAL REPORT
HS-805 235

Wintek Corp., Lafayette, Ind.
MICROPROCESSOR SELECTION AND SOFTWARE DESIGN
HS-026 465

Contract Number Index

DAAK70-78-C-0102
Coordinating Res. Council, Inc., Fuel Efficient Lubricants Group, 30 Rockefeller Plaza, New York, N.Y. 10020
HS-026 609

DOT-FH-11-8824
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DOT-FH-11-9385
Biotechnology, Inc., Falls Church, Va.
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HS-805 145

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HS-805 146

DOT-HS-6-01436
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HS-804 833

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HS-804 129

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HS-805 168

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HS-805 171

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DOT-HS-7-01789
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HS-804 854

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HS-805 262

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HS-805 227

DOT-HS-9-02095-T.O.-1
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HS-805 250

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HS-805 251

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HS-026 428

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HS-026 429

DOT-TSC-1456
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HS-026 605

DOT-TSC-682
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HS-026 628

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HS-026 444

F33615-78-C-0504
University of Dayton Res. Inst., 300 College Park, Dayton, Ohio 45469
HS-026 444

HPR-1(15)-PART-II
Purdue Univ., Joint Hwy. Res. Proj., West Lafayette, Ind. 47907
HS-026 618

HPR-1(16)-PART-I
Purdue Univ., Joint Hwy. Res. Proj., West Lafayette, Ind. 47907
HS-026 616

NHTSA-6-A273
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HS-804 790

NHTSA-9-6426
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HS-805 235

W-7405-ENG-48
University of California, Lawrence Livermore Lab., Livermore, Calif. 94550
HS-026 455

Report Number Index

AD-A062 118	HS-026 444
AMRL-TR-78-99	HS-026 444
AR-33	HS-026 449
ASTM-STP-621-S3	HS-026 509
CR-1	HS-026 447
CR-1102	HS-026 604
CR-2	HS-026 448
CRC-500	HS-026 611
CRC-501	HS-026 510
CRC-502	HS-026 609
CRC-505	HS-026 608
CRC-507	HS-026 607
DOT-TSC-RSPA-78-23	HS-026 628
DOT-TSC-RSPA-79-7	HS-026 605
ED79-11S	HS-805 248
EPA-TR-79-3	HS-026 603
EPA-550/9-79-311	HS-026 567
EPA-79-4A	HS-026 453
FHWA-HP-HS-77	HS-026 449
FHWA-RD-77-166	HS-026 602
FR-1061-07-79	HS-805 077
G-167-Vol-1	HS-805 244
G-167-Vol-2	HS-805 245
GMR-2733	HS-026 505
HFR-1769-1	HS-026 602
Info-Bull-1977-1	HS-026 488
JHRP-78-18	HS-026 618
JHRP-79-4: PR-108	HS-026 616
JHRP-79-6	HS-026 617
KAPPA-DOT-79-01	HS-805 145 HS-805 146
NBS-SP-480-36	HS-026 548
NHTSA-CAL-DMV-FOO-79-1	HS-805 152
NTSB-HAR-79-3	HS-026 550
NTSB-HAR-79-4	HS-026 561
NTSB-HAR-79-5	HS-026 549
PB-283 926	HS-026 489
PB-284 101	HS-026 488
PB-290 483	HS-026 602
PB-290 569	HS-026 453
PB-290 666	HS-026 603
R-NS79-14-02	HS-805 246
SAE-SP-433	HS-026 431
SAE-SP-434	HS-026 509
SAE-SP-440	HS-026 462
SAE-780977	HS-026 510
SAE-780979	HS-026 511
SAE-780980	HS-026 512
SAE-780981	HS-026 513

SAE-780982	HS-026 514
SAE-780984	HS-026 515
SAE-780985	HS-026 516
SAE-790030	HS-026 450
SAE-790031	HS-026 451
SAE-790234	HS-026 463
SAE-790235	HS-026 464
SAE-790236	HS-026 465
SAE-790237	HS-026 466
SAE-790238	HS-026 467
SAE-790239	HS-026 468
SAE-790240	HS-026 469
SAE-790241	HS-026 470
SAE-790338	HS-026 471
SAE-790339	HS-026 472
SAE-790341	HS-026 473
SAE-790342	HS-026 474
SAE-790343	HS-026 475
SAE-790401	HS-026 508
SAE-790499	HS-026 476
SAE-790590	HS-026 490
SAE-790683	HS-026 547
SB-34	HS-804 729
SB-35	HS-804 730
STI-TR-1065-1-II	HS-026 602
TFD-1979:6	HS-026 596
TP-1970	HS-026 604
UCB-ITS-LR-79-2	HS-026 627
UCRL-52558	HS-026 455
UM-HSRI-78-33	HS-026 441
UM-HSRI-78-35	HS-026 440
UM-HSRI-78-44-1	HS-026 439
UM-HSRI-78-44-2	HS-026 438
UM-HSRI-78-64	HS-026 442
UM-HSRI-79-1	HS-804 774
UM-HSRI-79-80	HS-805 227
VTI-174A	HS-026 459
3054-79-90A	HS-805 262
51002	HS-805 247
6071-79-106	HS-805 251
6071-79-107A	HS-805 250
6071-79-88-A	HS-805 252
8316-78-146A	HS-805 171
8316-78-70B	HS-805 168
95-126	HS-026 625
95-39	HS-026 624

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SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

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ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-026 569

TRAFFIC ANALYSIS ANNUAL REPORT, CALENDAR YEAR 1978 [DISTRICT OF COLUMBIA]

Traffic statistics are tabulated for all traffic accidents and fatalities within the District of Columbia in 1978 which were investigated by the Metropolitan Police Dept. and the Park Police Service. Previous years' statistics are presented in some tables to indicate trends. Data are given on accident locale (police district), day of week, time of day, road condition, visibility, driver characteristics, climate, seat belt use, vehicle action, lighting, vehicle characteristics, persons injured, bicycle involvement, comparisons with other cities, societal costs, pedestrian involvement, persons killed, alcohol and drug involvement, traffic citations, fines, accident countermeasure programs, and sources of traffic safety materials. For 1978 in the District of Columbia, there were 49 fatal and 2 multiple fatal accidents, 51 fatalities, 7157 injury accidents, 10,199 persons injured, 1259 pedestrian accidents, 1170 pedestrians injured, and 16,182 property damage accidents. Compared to 1977, there were more total accidents and pedestrians injured, but fewer motorist and pedestrian deaths, and fewer injury accidents and motorists injured.

by Winfred A. Harris
Metropolitan Police Dept., Traffic Enforcement Branch, 501 New York Ave., N.W., Washington, D.C. 20001
1979 ; 144p
Availability: Corporate author

HS-026 570

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?

A relationship between fuel consumption (gal/mi) and trip time, well-established and widely reported in the literature, is preferable on theoretical grounds and provides a superior fit to a wide variety of fuel consumption data, than a relationship presented by P. D. Christopherson and G. G. Olafson (ITE Journal v48 n11 (Nov 1978). The latter relationship (Equation 1) may be written as E equals 3.59 plus 0.40V, where E is the fuel economy of the composite vehicle simulated, in mi/gal, when traveling in traffic with an average speed of V mi/hr. The preferred relationship (Equation 2) is expressed as F equals A plus BT, or 1/E equals A plus B/V, where F is fuel consumption (gal/mi), T is average trip time per unit distance (hr/mi), E equals 1/F is fuel economy (mi/gal), and V equals 1/T is average trip speed (mph), where V is less than or approximately 35 mph. The parameter A is the fuel required to overcome rolling resistance; the parameter B is related to the idle fuel flow rate. Since Equation 1 has no physical interpretation, it necessarily yields increasingly inaccurate results as increasing traffic congestion produces lower travel speeds. Equation 2 relates to the physics of the automobile, yields meaningful results as congestion increases, and fits well a wide variety of data (including the data in the Christopherson and Olafson report which was generated by simulating various traffic networks).

by Leonard Evans
General Motors Res. Labs., Traffic Science Dept., Warren, Mich. 48090
Rept. No. GMR-2892 ; 1978 ; 8p 15refs
Prepared for publication in ITE Journal.
Availability: Corporate author

HS-026 571

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING

The prime impetus for U.S. development of on-board automobile microcomputers was the Federal emission regulations for the 1980's. Automakers are using a microcomputer air/fuel regulator system in combination with a three-way catalytic converter to meet emission goals. Microcomputers are also being used for such other tasks as engine control. Ford, in its 1978 Lincoln Versailles, introduced its Electronic Engine Control (EEC-I) System which calculates ignition timing and flow rates for exhaust gas recirculation, and Ford has since introduced an updated system (EEC-II) that performs more tasks. Although General Motors has been using its Computer-Controlled Catalytic Converter (C-4) system only for emission control, GM'S 1980 X-body cars introduced in California will have an updated C-4 system with engine-control functions. Chrysler, which has been using a computerized system not based on the microprocessor, will switch some 1980 models over to the widely used digital technology. Other functions of minicomputers in some 1980 model cars include keyless door locks, climate regulation, digital-readout dash displays, and radios. Automotive electronic applications are expected to increase dramatically in the next six years. Because some of the new electronic systems have a key role in car operation, extraordinary steps are being taken to test new hardware for reliability. The demand for microchips used with microcomputers is so large that semiconductor firms have instituted crash programs of expansion and production. Meanwhile, engineers are developing even more exotic car electronics for the mid-1980's, drawing on avionics concepts and fiber-optics technology.

by John Free
Publ: Popular Science v215 n2 p54-8 (Aug 1979)
1979 ; 3refs
Availability: See publication

HS-026 572

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB

General information on valve jobs is provided for the do-it-yourself car owner. Answers are provided to questions of when a valve job is necessary, what one entails, individual capability for doing the job, use of car's service manual (number 1 tool), and safety. Recommendations are given for seeking advice from the automotive machinist, for selection of replacement parts, for meeting state emission regulations, and for finding an automotive machinist shop. A short list of reference materials is provided. Step-by-step procedures and accompanying photographs are given for doing a valve job (including those aspects requiring a machinist). The photos show an overhead valve engine (1969 Ford 200 cu-in-displacement, six-cylinder). A typical valve-job checklist, and lists of parts and tools for a valve job are provided.

by Richard Day
Publ: Popular Science v215 n2 p92, 94, 96-8 (Aug 1979)
1979 ; 4refs
Availability: See publication

HS-026 573

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM

Honeywell's new Featherfoot program (a 1978 update of the original 1975 program) offered incentives to the company's fleet drivers in an effort to promote more fuel-efficient driving. Drivers were grouped into six categories according to their historical mileage ranging from 13.5 mpg to 18.0 mpg for the 4500 fleet automobiles. The 2500 trucks in the Honeywell fleet were grouped in a similar fashion, by driver performance ranging from below 10 mph to over 11.5 mph. The program consisted of three, two-month competition periods from Mar 26 to Sep 23, with the winners posted after each period. Two drivers from each of the nine categories who showed the greatest improvement over the entire six months won the grand prize, an all-expenses paid, three-day trip to Scottsdale, Ariz. The top 65 in each category showing the best improvement after a two-month period received a certain number of credits (depending on placement) which were redeemed for prizes. The program was publicized with stories in Honeywell's internal journal, home mailers on prizes, and tips on "Featherfooting" (maintenance, driving technique, idling, and use of vehicle equipment). Several checks were built into the program to verify that the drivers were in fact improving their mileage. Total outlays for prizes amounted to $146,036, while total gas savings were calculated at $254,550. Average corporate gas mileage during the first quarter prior to the program was 15.4 mpg for cars and 10.1 mpg for trucks. During the two quarters the program was in progress, fuel economy improved to 16.7 mph for cars and 11.2 mpg for trucks.

Publ: Automotive Fleet v18 n9 p21-3 (Jul 1979)
1979
Availability: See publication

HS-026 574

THE AUTOMOTIVE POPULATION EXPLOSION

The automotive "population explosion" has already had profound effects on life in the United States and in many other nations. On the plus side, use of motor trucks has vastly widened the geographical distribution of both agricultural and manufactured products and lowered their cost. Similarly, the flexibility provided by personal transportation vehicles gives their users greater access to educational, employment, medical, shopping, and recreational opportunities. On the negative side must be listed the rising costs of vehicles and motor fuels, air pollution, loss of population and jobs in central cities of developed nations, increasing traffic congestion in foreign countries, and direct and indirect costs of traffic accidents. Recent huge increases in energy costs make it uncertain whether growth in automotive use will continue unabated in the future. Nevertheless, automotive use will continue to expand in size and impact, to at least some degree, everywhere consumers can make free choices about how to spend their incomes. The vehicle population explosion is literally shaping the world's urban development, bringing a mixture of benefits and drawbacks.

by Anthony Downs
Publ: Traffic Quarterly v33 n3 p347-62 (Jul 1979)
1979 ; refs
Availability: See publication

HS-026 575

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT

An overview is presented of urban goods movement (UGM) problems and opportunities, and a strategy discussed for identifying short-range, low-cost opportunities for improving the UGM system which can be included in the Transportation Systems Management (TSM) plan for an urban area. Some of the typical UGM problem sources include deficiencies at shipping/receiving points (inadequate off- or on-street loading/unloading facilities, or poor access); deficiencies en route to shipping/receiving points (inadequate geometric design of roadways, lack of continuous routing in specific corridors, inadequate bridge capacity, or overhead and roadside obstacles); policies of public agencies (lack of enforcement of loading-zone restrictions, or poor land-use planning and control); and business operating policies (limitations on the use of receiving facilities, lack of centralized facilities at large complexes, or undesirable carrier response to lack of loading space). The long-range and short-range planning programs for urban transportation are subject to guidelines issued in 1975 by Urban Mass Transportation Administration and Federal Hwy. Administration. Although UGM is not specifically mentioned, some communities have included it in their transportation plans. Analysis of the UGM system consists of appraisal (by Community Quick Check, interviews with the UGM community, mail and field surveys), evaluation of alternative opportunities (quantification of UGM problems and opportunities, UGM Advisory Panel meetings), and implementation (TSM plan, Transportation Improvement Program).

by Arun Chatterjee; Robert A. Robicheaux; Ernest R. Cadotte; Frederick J. Wegmann
Publ: Traffic Quarterly v33 n3 p381-95 (Jul 1979)
1979 ; 6refs
Based on research sponsored by Federal Hwy. Administration.
Availability: See publication

HS-026 576

EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL

Criteria are presented for evaluating fuel conservation policies at the community level: size of impact area, availability of technology, presence of counterproductive factors, cost/effectiveness, conflicts with general plans, public acceptance/rejection or equitability, and amount of fuel saved. Reasons for rejection of possible fuel conservation policies are listed under each criterion. At the community level there are very few individual policies that can be implemented in the short term to achieve substantial fuel savings. Many of the policies discussed, that failed one test or another, would have also failed the final test of fuel savings. There are notable exceptions such as fuel rationing, excise taxes on "gas-guzzler" automobiles and motor fuel tax surcharges, and improvements to vehicle operating efficiencies. These either are not effective if implemented unilaterally at the local level or else require Federal mandates to stimulate technological innovation. At the community level, planners should implement long-range land use reforms and incentives that support carpool and vanpool programs, coordinating these policies with those of higher planning echelons, in order to be effective. Land-use reforms could be counterproductive unless coordinated at regional levels for large commuter sheds. Carpool and vanpool incentives must be combined with Federally-authored fiscal disincentives that discourage automobile use. Other programs with lower potential fuel saving capability are shuttle and jitney service, and bicycle and pedestrian facilities.

by Peter G. Flachsbart
Publ: Traffic Quarterly v33 n3 p397-412 (Jul 1979)
1979 ; refs
Availability: See publication

HS-026 577

ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE

A wide range of approaches to accessibility, as found in various environmental and urban planning disciplines, is reviewed in the attempt to find a common basis for formulating a general theory or definition of the accessibility concept. Definitions are discussed from the points of view of traffic engineering, transportation planning, environmental planning, urban economics, and comprehensive urban planning. A concept summarized from those of the above-mentioned disciplines defines accessibility as circulation that produces environmental problems; as an essential catalyst in distributing economic and social benefits; as a consumable and tradeable commodity; and as one of many activities comprising the urban way of life. Each discipline uses its own models and measures to describe and evaluate accessibility; these fall into two categories: operational measures and behavioral models. It is concluded that a comprehensive measure of accessibility is not yet available and it is recommended that planners continue to use the existing measures, selecting them according to the criteria of the nature of the problem and the period of time available for solution. Planners should also be aware that one approach does not preclude further analysis and that the environmental effects of accessibility must always be dealt with.

by Abishai Polus; Moshe Kumove
Publ: Traffic Quarterly v33 n3 p429-42 (Jul 1979)
1979 ; 18refs
Availability: See publication

HS-026 578

ALTERNATIVES ANALYSIS FOR ARTERIAL STREETS

Improving segments of arterial streets provides a means of upgrading urban transportation systems without the political controversy and delay often associated with more capital-intensive transportation improvements. Evaluating the impacts of proposed arterial street improvements, and selecting which improvement(s) should be given priority, requires a method of analysis that provides supporting documentation for informed decision making. A series of impact analysis methodologies and an eleven-step evaluation technique are described which have been used in actual practice and have proved workable. The methodologies were applied to five alternative improvements proposed for a one-mile segment of a two-way Chicago street served by two bus routes; the alternatives included continuation of the present no parking restriction from 4 PM to 6 PM, northbound; no parking in either direction, same hours; exclusive bus lane northbound (4PM-6PM); parking permitted in both directions; and traffic engineering improvements (additional left turn lanes and progressive signal timing). Impact classification schemes are tabulated and classified under eight functional categories: transportation, economic, environmental, community facilities and services, relocation, aesthetics, social, and financial. The unit of measurement is indicated for each category, as well as the methodology for estimating impact. Each of the 11 steps in the evaluation technique is discussed and a sample achievement matrix is supplied for the Chicago street. The alternative of traffic engineering improvements was judged better than any other alternative.

by Rick Kuner
Publ: Traffic Quarterly v33 n3 p459-72 (Jul 1979)
1979 ; 9refs
Based on a study sponsored by Chicago Dept. of Planning, City and Community Devel.
Availability: See publication

HS-026 579

MOTOR VEHICLE STATISTICS OF JAPAN 1979

Japanese motor vehicle statistics are tabulated and graphed through the year 1978. Vehicle-in-use data are provided for cars, trucks, buses, and special-purpose vehicles, 1956-1978; diesel vehicles, 1961-1978; and vehicles by year of first registration, 1978. New registration data cover cars, trucks, and buses, 1956-1978; 1976, 1977, 1978 by months; new import car registrations by make, 1974-1978; and 1969-1978 registrations by make. Production statistics are given for cars, trucks, and buses, 1956-1978; 1976, 1977, 1978 by months, 1956-1978 by make; cars by cylinder capacity, 1966-1978; buses by passenger capacity, 1966-1978; and trucks by loading capacity, 1966-1978. Import data cover cars, trucks, buses, and other, 1972-1978; and 1978 imports by countries of origin. Export data cover cars, trucks, and buses, 1956-1978; 1961-1978 by make; and 1978 exports by destinations. Statistical information on motorcycles and motor scooters includes that for vehicles-in-use, 1956-1978; production, 1956-1978; production by months, 1976, 1977, 1978; production by make, 1956-1978; factory sales to domestic market, 1961-1978; exports, 1956-1978; and 1978 exports by destinations. A list of member manufactures, with addresses, is appended.

Japan Automobile Manufacturers Assoc., Inc., Washington Office, 1050 17th St., N.W., Washington, D.C. 20036
1979 ; 32p refs
Availability: Corporate author

HS-026 580

GUIDE TO THE MOTOR INDUSTRY OF JAPAN 1979

The position of the automobile industry among Japan's other manufacturing industries, and the growth of the country's auto industry are briefly described, accompanied by glossy, color photographs of Japanese highway systems and new vehicle models. Offices, plants, historical and present record, and main products are listed for each of the motor vehicle manufacturers. A general catalog is provided of representative models (passenger cars, commercial vehicles, motorcycles and mopeds) offered by the automakers as of 31 Mar 1979. Black-and-white photos of the models are accompanied by primary vehicle specifications. Photos and descriptions are also provided of some of the representative automotive parts, testing equipment, and tools. Detailed specifications are tabulated for all the makes/models of passenger cars, trucks, buses, tractors and truck cranes, and two-wheelers. Motor vehicle statistics (production, exports, registrations) are tabulated. A directory is presented of automotive organizations and manufacturers.

Japan Motor Industrial Federation, Inc., Otemachi Bldg., 6-1, 1-chome, Otemachi, Chiyoda-ku, Tokyo, Japan
1979 ; 247p
Availability: Japan Automobile Manufacturers Assoc., Inc., Washington Office, 1050 17th St., N.W., Washington, D.C. 20036

HS-026 581

CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977

All known available sources that contain statistics on fleet vehicles in the U.S. are described. Fleet operations in the U.S. are characterized according to stock composition and operational characteristics. Properties of fleet cars are compared with those of the total car population, which is dominated by cars for personal use. Elements considered include purchase decisions, differences in stock composition (especially size breakdown), and differences in operating characteristics. A comparison is made among fleets used by different sectors, such as business, utility, and police. The significance of fleets to transportation energy conservation is addressed. Principal findings include the following information: there is no universal definition of fleet; cars sold for fleet use represent 13% of total new car retail sales; cars in fleet service of ten or more cars represent 6.5% of the total U.S. car stock; business fleets dominate the fleet stock (46%); individually leased and daily rental fleet categories exhibit the fastest growth (12% and 8% per year, respectively); standard size fleet cars are being replaced by new smaller intermediates with downsized engines; fleet cars are driven more mi/yr than cars in general; efficiency improvements on new cars are implemented in fleets more quickly and filter to the general public faster through the used car market; and fleets offer some special opportunities for new or limited-performance vehicles.

by D. B. Shonka
Oak Ridge National Lab., Energy Div., Oak Ridge, Tenn. 37830
W-7405-eng-26
Rept. No. ORNL/TM-6449 ; 1978 ; 47p 31refs
Transportation Energy Prog.: Monograph Series.
Availability: NTIS $5.25 printed copy, $3.00 microfiche

HS-026 582

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT

Practical guidelines are provided for the development, design, and operation of driver displays, both visual and auditory, for freeway traffic management. Emphasis is placed on the recommended content of messages to be displayed in various traffic situations; the manner in which messages are displayed (format, coding, style, length, load, redundancy, and number of repetitions); and location of messages with respect to the situations they are explaining. In addition to data on developing effective message content, information is provided on types and characteristics of changeable message signs, and on sign visibility and legibility criteria. The guidelines for incident management/route diversion situations are based on both research and operational experience and are basically restricted to information displays for freeway corridors.

by C. L. Dudek; R. D. Hutchingson; W. R. Stockton; R. J. Koppa; S. H. Richards; T. M. Mast
Texas A and M Univ., Texas Transportation Inst. College Station, Tex. 77843
DOT-FH-11-8505
Rept. No. FHWA-RD-78-5 ; 1978 ; 384p refs
Rept. for Jun 1974-Sep 1978.
Availability: NTIS

HS-026 586

AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979

Testimony from a congressional hearing on future automotive technology is presented, with additional supporting articles, letters, and statements. This hearing was convened to address the current status and future potential of automotive development in particular view of the energy crisis. Witnesses included the Secretaries of Transportation and Energy, congressmen, the Director of the Office of Technology Assessment, and representatives from Ford Motor Co., General Motors Corp., American Motors Corp., and Chrysler Corp. Additional material was submitted by government officials, the auto industry, research organizations, academia, and public interest groups.

Congress. Senate Com. on Commerce, Science, and Transportation, Washington, D.C.
Rept. No. 96-14 ; 1979 ; 197p refs
96th Congress, 1st Sess.
Availability: GPO

HS-026 587

DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE

Marla Ellery of Burlington, Ontario is challenging a Canadian regulation (Regulation 906/76 of the Highway Traffic Act) which bans diabetics who use insulin from driving trucks over 18,000 lb. This restriction was added on the advice of diabetes specialists who stated that diabetics are subject to seizures which could cause them to lose control of a vehicle (position of the Canadian Medical Assoc.). Mrs. Ellery says she has never had a problem with her illness in the 20 years she has been a diabetic. After completing the Canadian Inst. of Tractor Trailer Training course in Sutton, Ont. in 1973 with a 98% mark, top in the class, Mrs. Ellery drove trucks in the range of 23,000lb to 43,000 lb. She now has a "G" license, which allows her to drive a tractor-trailer if an "A" licensed driver is in the cab. The U.S. Federal Motor Carrier Safety Regulation similarly bans diabetics who use insulin from operating a motor carrier. Mrs. Ellery has been undergoing tests at the MacMaster Univ. Medical Clinic; an opinion will be submitted to her family physician and the Ministry of Transportation and Communications. The examining physician at the Clinic says that the decision of whether diabetics should be allowed to drive big trucks depends on the individual case. In the meantime, Mrs. Ellery is soliciting letters from other diabetics who are truckers and will take the correspondence to the Ontario government and plead her case.

by Mary Hepburn
Publ: Bus and Truck Transport v55 n6 p42-3 (Jun 1979)
1979
Availability: See publication

HS-026 588

IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL

Sales of small cars, both domestic and imported, soared in the U.S. in the first half of 1979 as gas station lines, concern over gasoline availability, and rapidly rising gas prices increased consumer demand for more fuel-efficient cars. Sales of domestic subcompacts and compacts followed the same pattern as imported cars, with slow sales early in the year and a sharp increase beginning in Mar. Including foreign autos, small cars made up over 60% of May sales. A Commerce Dept. projection puts total small car sales in 1979 at 10.6 million (2.3 million imports and 8.3 million domestics). Dealers' inventories of domestic new cars are estimated to have reached a record 2 million units at the end of May. The inventory situation reversed from Jan, when small cars were overstocked and large cars were in tight supply. In general U.S. automakers are unable to increase production to meet the small-car demand. A larger increase in the production of small cars cannot be achieved before the 1981 model year. Even if the shift is short-lived, it is unlikely that consumers will ever purchase as many large cars as in 1978. Car production in model year 1979 will probably total 8.8 million units (about 3.9 million subcompacts and compacts, some 4.9 million larger models). For the next model year as a whole, the Commerce Dept. projects that about 8.2 million cars will be produced (of these probably less than 4 million will be larger cars). The decline in auto production will have a large impact on employment in the industry and its suppliers of materials (rubber, zinc, aluminum).

by Courtenay Slater; Joseph G. Carson
Publ: Business America v2 n15 p22-3 (16 Jul 1979)
1979 ; 2refs
At head of title: Economic Highlights.
Availability: See publication

HS-026 589

HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS

The components of a shock absorber are illustrated, and absorber function and operation described. Signs are outlined which indicate that shocks need replacement. Two important tips are mentioned: if one shock needs to be replaced, so does the other shock on the same axle; replacing shock absorbers will not solve riding and driving problems caused by other conditions. Information is given on the three general types of shock absorbers: replacement (OEM-COMPARABLE (original equipment), heavy-duty, extra-heavy-duty, adjustable, or MacPherson), load-carrying (shocks combined with coil springs), and special-purpose (include those for racing cars, medium and heavy trucks, and buses). It is advised not to buy shocks unless they are accompanied by instructions. A list is provided of some "do's" and "don'ts" to guide an individual car owner ("Saturday mechanic") in replacing shocks. A separate section describes the evolution of the modern shock absorber.

by Mort Schultz
Publ: Popular Mechanics v152 n2 p82-4, 122 (Aug 1979)
1979
At head of title: Saturday Mechanic.
Availability: See publication

HS-026 590

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT

A model to predict some anthropometric, biomchanical, and work physiology parameters from age, height, and weight is described, including its capabilities and restrictions. Predicted values of 83 ergonomic parameters for a sample of 250 healthy males show close agreement with the observed values reported in the available literature. The model requires updating and refinement when more exact formulae become available. Development of a similar model for the female population is needed. Inclusion of psychological parameters such as the human reaction time, channel capacity, and information processing capability, is highly desirable. Effects of noise, heat, vibration, and illumination on human performance and comfort need to be quantified as to age, weight, and height. Proper use of the model will provide useful data for design purposes. Industrial applications of this model include pre-employment screening, job placement, in-plant physical fitness programs, job classification, work-rest scheduling, and workplace design.

by A. Roozbazar; Gordon W. Bosker; Michael E. Richerson
Publ: Ergonomics v22 n1 p43-58 (Jan 1979)
1979 ; 25refs
Includes German summary.
Availability: See publication

HS-026 591

SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS

Traffic speed and flow data were recorded at nine road tunnels in England and Scotland at various times between Oct 1972 and Aug 1976 in order to determine speed/flow relationships. At two sites, speeds were also recorded on sections outside the tunnels. The speed/flow values for the observed tunnels fall generally within the area of data obtained for suburban main roads and are somewhat lower than those found for rural main roads. The typically wide scatter of speed/flow observations at individual sites and the considerable difference in patterns between sites do not permit the establishment of separate speed/flow relationships for the tunnels. From the limited evidence at the two sites where speeds were measured on the open road adjacent to the tunnel, it is concluded that short, straight, well-illuminated tunnels do not markedly affect traffic speeds.

by A. P. Bampfylde; G. J. D. Porter; S. D. Priest
Mott, Hay, and Anderson; Transport and Road Res. Lab., Tunnels Div., Crowthorne, Berks., England
Rept. No. TRRL-SR-455 ; 1979 ; 37p 8refs
Abridged version of report appeared in Traffic Engineering and Control v19 n8/9 (Aug-Sep 1978).
Availability: Transport and Road Res. Lab., Tunnels Div., Crowthorne, Berks., England

HS-026 592

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION

A computer simulation model of the fuel consumption of heavy goods vehicles (commercial trucks) is described, and results of validation tests provided. The model was designed to represent different vehicle shapes, power plants, and transmission systems, as well as the interaction of the vehicle and driver over road routes. The driver was characterized by the use of the accelerator (percentage engine load) and gear selection. Different operating conditions were simulated and results compared with those produced by an instrumented tractor/flatbed trailer combination operating at different gross vehicle weights (GVW). A comparison was made over short distances and defined conditions on the Transport and Road Res. Lab. test track. Large percentage differences in fuel consumption were found when small amounts of fuel were used over short distances, but good overall agreement was achieved. The largest discrepancy occurred in the unladen condition on the test track, a condition which coincided with the least accurate input data. When longer road routes, including sections of urban and rural roads and highways, were simulated, the model accurately predicted the fuel consumption for all GVW'S tested.

by M. A. Renouf
Transport and Road Res. Lab., Transport Engineering Div.,
Crowthorne, Berks., England
Rept. No. TRRL-SR-453 ; 1979 ; 35p 11refs
Availability: Corporate author

HS-026 593

SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW

Speed control bumps designed at the Transport and Road Res. Lab. have had a one-year trial on two public roads; Abbotsbury Rd., Kensington (England) and Barlanark Rd., Glasgow (Scotland). Details are given of the method of construction of the bumps and the effects of installation on public opinion, traffic, and accidents. The speed bumps on these roads appeared to be effective in reducing vehicle speed and traffic flow. The marginal reduction in the number of traffic casualties on each of the roads was not statistically significant. Although no increase in accidents was noted on possible alternative routes to Abbotsbury Rd., there was an increase on the roads surrounding Barlanark Rd., possibly related to diverted traffic. The bumps were acceptable to the majority of both residents and drivers who continued to use the roads.

by R. Sumner; C. Baguley
Transport and Road Res. Lab., Road User Characteristics Div.,
Crowthorne, Berks., England
Rept. No. TRRL-SR-456 ; 1979 ; 26p 5refs
Availability: Corporate author

HS-026 594

CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE

As part of a study of the use of cars in peak periods, staff at an isolated, rural workplace in Berkshire, England were surveyed to determine how they traveled to work. The survey concentrated on the choice between driving alone and carpooling. Information was obtained via a questionnaire from the approximately 700 employees (greater than 90% response) and a follow-up survey of carpoolers (90 out of 99 contacted). As expected, carpoolers were more likely than solo drivers to live in urban areas. Carpoolers' trip lengths had a smaller range (5 km to 25 km) than that of solo drivers; for short journeys, it is not worth forming a carpool, and for long journeys, it is difficult to find people with whom to form a carpool. Only about half the carpoolers picked up their fellow passengers at home; in the other pools, the passengers walked or drove to a convenient meeting place. The survey results were modeled using a Logit model in an attempt to quantify factors affecting the choice of single drivers and carpoolers. Although the results are subject to large errors, it is indicated that diverting 1 km to meet a carpool partner is perceived to be about as inconvenient as traveling an extra 5 km. The study indicated that increasing the marginal cost of driving by 25%, or imposing a parking charge of 10 p/day more for solo drivers than the average paid by carpoolers, is likely to cause about 5% of the solo drivers to carpool.

by K. Wood
Transport and Road Res. Lab., Public Transport Div.,
Crowthorne, Berks., England
Rept. No. TRRL-SR-462 ; 1979 ; 22p 4refs
Availability: Corporate author

HS-026 595

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS

An overview is presented of the contribution of heavy goods vehicles, (HGV'S, commercial trucks) to the road accident situation, based on 1974 data for Great Britain but probably reflective of situations in other European countries. Accident-avoidance features that can be incorporated into HGV'S are discussed, as well as design features to reduce injuries to other road users. The risk of a medium or heavy goods vehicle being involved in a serious accident in the U.K. has been reduced almost by half in ten years, down to about 27 trucks/100 million km traveled in 1975 (slightly lower than for a car). HGV'S are disproportionately accountable for casualties to other road user types. Improvements in tire traction on wet roads, braking system performance, loading and load-securing techniques, and design features affecting rollover and compatibility with other vehicles could aid in reducing HGV accidents. Auxiliary brakes and retarders may cause loss of control if not properly matched to the service brake system. Bumpers at heights matching those of cars and energy-absorbing structures would reduce casualties to restrained occupants of smaller vehicles in front and rear impacts. The front structure of HGV'S is more important than the rear in terms of accident frequency. Improved cab designs could reduce the incidence of crushing and trapping of truck occupants. Higher power-to-weight ratios without precautions to control drive axle spin up will increase the risk of loss-of-control accidents. Proposed regulations need to be validated by full-scale experiments.

by I. D. Neilson; R. N. Kemp; H. A. Wilkins
Transport and Road Res. Lab., Vehicle Safety Div.,
Crowthorne, Berks., England
Rept. No. TRRL-SR-470 ; 1979 ; 16p 3refs
Presented at Organisation for Economic Co-operation and Devel. Symposium "Heavy Freight Vehicles and Their Effects," Paris, 14-16 Nov 1977.
Availability: Corporate author

HS-026 629

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977

Thirty-eight papers, presented orally at an international symposium on vehicle-road and vehicle-track dynamics, particularly addressed problems involving the contact or guiding forces which act between vehicle and road surface or vehicle and guiding track. Specific attention was given to new methods and techniques for studying system dynamics. Lateral dynamics, stability, control analysis, and riding comfort on rigid or elastic supports were covered during eight sessions; five sessions were devoted to road vehicle mechanics and the other three to track-guided systems. The sessions were grouped according to vehicle type, ranging from motorcycles to truck-trailer systems and magnetically levitated trains.

by I. Slibar, ed.; H. Springer, ed.
1978 ; 539p refs
Includes HS-026 630--HS-026 655. See also four state-of-the-art papers, not presented orally, pub. in Vehicle System Dynamics v6 n4 (Oct 1977).
Availability: Swets and Zeitlinger, B. V., Publishing Office, Vehicle System Dynamics, 347 B Heereweg, Lisse, Netherlands

HS-026 630

FRONT WHEEL VIBRATIONS

The fundamental aspects of wheel suspension/steering system dynamics with and without road contact are examined. Possible means are analyzed to reduce the system sensitivity to external disturbances such as wheel unbalance, and to compensate for vibrations caused by tire nonuniformity. The in-plane behavior of the tire is considered separately. An outline is provided of the development of a computer program, FROVIB (Front Wheel Vibration), for the frequency response analysis of complicated suspension-steering systems. The program can analyze systems with either an unloaded freely rotating wheel or a rolling tire that has dynamic rolling contact properties. The program is valid for such suspension configurations as trailing arm systems, wishbone suspension systems, McPherson systems, or modified McPherson with flexible upper mount.

by H. B. Pacejka; J. Van Den Berg; P. J. Jillesma
Delft Univ. of Technology, Vehicle Res. Lab., Delft, Netherlands
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p1-20
1978 ; 4refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 631

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE

The effect is analyzed of the mechanical description of the car and the mathematical approximation of the tire behavior on the theoretical simulation of vehicle performance. Two four-wheel car models are used to derive the governing equations; the first model explicitly considers the suspension car body interaction while the second derives the four normal wheel forces by an additional equation. Two different approximations of tire characteristics are utilized, and a bias and a radial tire are compared. The path taken by the vehicle consists of a straight track, a transient spiral, and a bend of constant curvature, with changes in superelevation. With respect to wheel contact force ratios, it was found that the tire approximations had a greater and less satisfactory effect than the vehicle modeling. In terms of vehicle handling, the advantages of the first model are counterbalanced by a less detailed description of the tire behavior. The differences between bias and radial tires in terms of tire contact and vehicle handling are so important that there can be no comparison between vehicle model/tire approximation combinations using different tire types. For normal acceleration less than 0.4 g, every model/approximation combination with the same tire types can be utilized.

by Peter Lugner
Technische Universitat Wien, Institut fur Mechanik, Karlsplatz 13, A-1040 Wien, Austria
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p21-39
1978 ; 10refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 632

DYNAMICAL ANALYSIS OF SUSPENSION SYSTEMS

Suspension systems with spatial kinematics are modeled by multibody systems consisting of rigid bodies, springs, shock absorbers, and joints. The nonlinear and linearized equations of motion are derived in symbolic form using a computer. Symbolical equations of motion assure minimal computation time in the dynamical analysis of suspensions. A dynamical analysis is presented of the vehicle's ride comfort, safety, and joint forces. As an example of the method's application, the transversal link suspension of a completely symmetrical vehicle is analyzed. The equations of motion are shown in the nonlinear version, and a design parameter is optimized in the linearized version. The method may be more advantageous for more complex asymmetrical suspension models.

by Werner O. Schiehlen
Universitat Stuttgart, Institut B fur Mechanik, Pfaffenwaldring 9, D-7000 Stuttgart 80, Federal Republic of Germany
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p40-8
1978 ; 9refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 633

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES

Four simulation models of different complexity for describing the steering behavior of two-axled automobiles are compared to demonstrate the degree of complexity required to solve a specific problem. Model 1 (the most complicated) evaluates tires, suspensions, steering, spring, damping, and the most important interactions very accurately. Model 2 is a four-wheel model with a specific roll axis. Several nonlinearities are simulated as functions of spring deflection. Model 3 is a simple four-wheel model with nonlinearities only for the simulation of the tire characteristics. Model 4 is a simple two-wheel model. The computing time needed to solve the same problem increases from model 4 to model 1 by the following proportions: 1, 2, 5, and 50. The two-wheel model gives qualitative results only, but the improved four-wheel model (model 2) with four degrees of freedom and good approximations of the nonlinear characteristics of tires, springs, steering, steering compliances, and damping provides an accurate simulation of actual vehicle behavior.

by Klaus Rompe
TUV Rheinland, Institut fur Sicherheitsforschung im Strassenverkehr, Koln, Federal Republic of Germany
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p49-56
1978 ; 3refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 634

TRANSIENT CONTROL RESPONSE OF AUTOMOBILES

A comparatively simple, three degree-of-freedom model is described for investigating the transient control responses of four-wheel vehicles and the influence of design factors on such responses. The procedure and analysis method for measurements of vehicle frequency responses from a pseudo-random steer input test is presented with results to illustrate the quality of the test, and its ability to detect vehicle changes. The relationship between steady-state response and transient response is discussed. Examples show the very important contribution to the overall transient response that can be made by the geometrical and compliance losses in the steering systems. Although yaw-rate response time has previously been considered the most important transient response parameter, the author considers that lateral acceleration response, response gains, and steering torque characteristics play an important role in the subjective evaluation of steer response.

by N. P. Smith
Motor Industry Res. Assoc., Watling St., Nuneaton, Warwick, CV 10 OTU, England
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p57-65
1978 ; 6refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 635

THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE

The vibrations occurring within the transmission system of a motor vehicle under transient driving conditions are theoretically investigated, with emphasis on the initial acceleration of a passenger car. An eight degree-of-freedom vehicle model is presented which contains 39 independent parameters. Using 12 of these parameters, a tire theory is introduced which makes it possible to calculate transient longitudinal shear stress distributions along the tire contact patch of the driving wheels for each point in the acceleration process. Numerical calculations are presented for a passenger car with a specific wheel suspension. Peak values of transmitted torques within the driving system are calculated, and the transient tire behavior is expressed primarily in terms of the adhesion coefficient and tire slip, the steady-state relation between these parameters having been found invalid for describing tire behavior under acceleration.

by H. Springer; G. Weisz
Technische Universitat Wien, Institut fur Maschinendynamik, Karlsplatz 13, A-1040 Wien, Austria
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p66-84
1978 ; 3refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 636

COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]

The deformation behavior of the inflated, prestressed system of a tire's belt and carcass is computed. Good agreement is found between calculations and measured results, which show that the contact pressure distribution and lateral deformation under side load can be computed by tire design parameters. An optimal design of the tire cross section is therefore possible. The influence of the belt on the elastic deformation of the tire material is shown. The overall shear stiffness of construction is strongly dependent on load and should be computed from measurements; the bending stiffness of the belt is not dependent on load. Cornering forces are computed by a three-band model of contact patch and show good agreement with measured results. The influence of the contact patch on cornering forces gives rise to a second order differential equation for determing the lateral deformation of the belted tire during quick steering maneuvers.

by F. Bohm
Semperit A. G., A-2514 Traiskirchen, Austria
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p85-103
1978 ; 13refs
Symposium held in Vienna, 19-23 Sep 1977.
Availability: In HS-026 629

HS-026 637

A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS

A general-purpose digital computer program is described for the dynamic simulation of tracked high-speed ground transportation system vehicles and their interaction with guideways. The program, which has application to a broad class of transportation systems, eliminates the need for numerous specialized programs. The models which can be treated are as follows: multibody rigid or elastic vehicles, any degrees of freedom, kinematic constraints; a variety of linear and nonlinear suspension laws including active control systems; elastic guideways (or bridges) including irregularities; and straight or curving motions (curves, grades), and travel at constant or variable speed. Special features of the resulting simulation program are automatic generation of the linearized system equations, generation of subroutines to reduce the numerical effort, and modular construction of the whole program. The time response of the overall time-varying and possibly nonlinear-state equations is obtained via numerical integration. The program is supplemented by evaluation and interpretation routines which allow computation of vehicle stability, controllability, and observability as well as the transfer function matrix. The time responses can be Fourier-transformed and vehicle ride quality calculated. As a typical application, the simulation of an electrodynamic repulsion system design is presented, for both the magnetically suspended as well as the emergency mode.

by W. Duffek; W. Kortum; O. Wallrapp
DFVLR, Oberpfaffenhofen, Federal Republic of Germany
Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p104-26
1978 ; 7refs
Symposium held in Vienna, 19-23 Sep 1977. Research sponsored by German Ministry of Res. and Technology.
Availability: In HS-026 629

HS-026 638

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES

The conflicting requirements of tracking accuracy and passenger comfort are discussed as they affect the performance of automatically steered, rubber-tired vehicles on both straight and curved guideways. The optimal performance for operation on straight guideway containing random lateral reference errors is presented. This performance, the best achievable with any controller of the class considered, provides a standard against which simpler, suboptimal controllers can be evaluated. A simple proportional controller using a single displacement sensor is shown to produce near-optimum performance for the typical vehicle studied when operated at the design speed. Performance of the proportional controller on curved guideway is simulated to evaluate tracking errors and ride comfort. It is shown that by appropriate location of the position sensor, steady-state errors in curving can be made small for the practical range of curve radii. Curve entry transients are simulated for a curve having no transition spiral and a steady-state lateral acceleration of 0.223 g at 13.4 m/sec. Acceleration and tracking error overshoots are both less than 13.3% for well-chosen gains. These results suggest that a simple proportional controller can yield good performance on both straight and curved guideways for a vehicle having well-designed open-loop dynamics.

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HS-026 639

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL

A numerical and analytical study of the feasibility of an onboard vehicle control of traffic strings (distance between following vehicles) is presented. The control logic for the individual vehicular control is based entirely on the absolute velocity of the vehicle and its relative displacement and velocity to the preceding vehicle. All are easily measured quantities, and the resulting control gives constant time-headway spacing. The required hardware elements include a velocity transducer, a radar, a microcomputer, and an activator system. It is expected that most of the position keeping control will be accomplished by throttling, braking being reserved for emergency or near emergency situations. The throttle control is combined with cruise control which the driver can engage at will. Power or vacuum assisted brakes make braking control easier. The entire control system can be overridden when the driver wishes, at which time it is switched off automatically until reset. Stability properties are considered from a systems viewpoint involving the entire traffic string rather than one or two vehicles. The dynamic system does not include automatic steering and thus has easily adaptable dual-mode characteristics.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p136-44
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HS-026 640

AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT

The theoretical and experimental work involved in the development of a bus which operates under lateral track control is described. In this vehicle a controller performs the steering normally done by the driver. The following research areas are discussed: derivation of a vehicle model, measuring the vehicle frequency responses, analyzing the developmental steps necessary to obtain optimal vehicle behavior, describing and evaluating the design methods used to find optimal controllers, and experimental testing of the vehicle driving behavior. A prototype vehicle was constructed and driving tests were performed on a special test track.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p145-64
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HS-026 641

ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES

The cornering performance of heavy trucks incorporating multiple, nonsteering rear axles and dual tires is examined in the linear regime to identify how this performance differs from that of the simple two-axle, four-wheel vehicle. Multiple, nonsteering rear axles and dual tire arrangements are seen to increase the steer angles required to negotiate a turn because these elements produce a moment resistant to turning. Vehicles which have these elements may be characterized by an "effective wheelbase" which is greater than the geometric wheelbase. Experimental data are shown which verify steer angle predictions made using this characterization. "Effective wheelbase" depends on tire stiffnesses, as well as vehicle geometry, and thus is dependent on loading conditions. An optimum wheelbase for highest maneuverability is shown to exist. Because cornering is dependent on "effective wheelbase," errors can occur in measurement of truck understeer/oversteer gradients if this dependence is not properly taken into account. To avoid such errors, the constant radius test method is recommended. The effect of speed on heavy-truck cornering is characterized by an understeer expression similar to that for simple vehicles, and is dependent on the geometric wheelbase. Because of the load dependence of the low speed steer angle term, it is observed that trucks may respond differently to fore/aft center of gravity shifts. Specifically, conditions are cited for which path curvature gain may increase with forward shifts of the center of gravity, a result which is contrary to behavior typical of passenger cars. The transient response of heavy trucks is likewise considered in order to determine the effect of multiple, nonsteering rear axles and dual tires on directional damping, natural frequency, and response time. Losses in limit cornering capability deriving from these design arrangements are also discussed. The reduction in the turn resisting moment occurring at limit maneuver performance conditions is important in contributing to vehicle "spin out" tendencies.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p165-83
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HS-026 642

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES

An articulated vehicle (tractor-semitrailer) model is described which has six degrees of freedom (tractor forward speed, lateral velocity, yaw velocity, and roll angle, and trailer articulation and roll). The origins of the axis system are located at the theoretical hinge position of the fifth wheel coupling. The kinematic effects of the coupling are described; the coupling is also assumed to act as a torsional restraint with the torsion axis aligned with the x axis of the tractor. The model is shown to compare with previous articulated vehicle models developed by the author, and a program of study is described which examines the performance of the articulated vehicle while negotiating a traffic circle.

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HS-026 643

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK

A simulation model previously refined by C. C. MacAdam is used to investigate sustained pitching and bouncing oscillations during antilock braking of a heavy truck. Calculated time histories of deceleration, pitch, bounce, and axle loads are presented to describe the form of the observed oscillations. Energy concepts are used to analyze a typical cycle of the sustained oscillations, and conditions under which the oscillation amplitudes increase or decrease are discussed. Computer analyses showed that the baseline vehicle will exhibit severe pitching and bouncing motions and degradation of stopping performance under the following combination of conditions: a high center of gravity load; a good, uncontaminated road surface for making the stop; typical levels of brake imbalance and hysteresis; and an antilock system which tends to reduce the air pressure in the brake chambers to atmospheric pressure after wheel lock becomes imminent. Results of a parametric study indicate that changes in brake and suspension properties typical of in-service variations have a significant influence on the pitching and bouncing of the baseline vehicle; that the influence of pitching and bouncing can couple with antilock system operation to degrade stopping distance; and that a pressure modulation scheme which controls the level of pressure reduction during antilock cycling would be effective in attenuating pitching and bouncing while reducing stopping distance for the baseline vehicle.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p203-21
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HS-026 644

ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE

Single-profile description of a road surface as a random process has proved an effective basis for vehicle response analysis. More realistic response analysis requires the description of profile-pairs (descriptions of near- and off-side tracks made by vehicles). Adoption of the hypothesis of isotropy, together with a single road-profile description, permits an entire surface to be described simply. A particular profile description can then be made the basis of an isotropic model from which the required track cross-spectra can be derived for any desired track width. Coherency functions obtained from this model have been compared with measurement-based coherencies for a variety of roads. It is concluded that the isotropic model is of value where approximation rather than precision is required.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p222-8
1978 ; 4refs
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HS-026 645

THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR

An experimental and analytical study demonstrates the effect of road roughness on the driver-vehicle system in terms of driver vertical acceleration (ride quality), lateral tire forces (related to vehicle handling), and normal tire forces (acting between the road surface and the tires). By establishing acceptable levels for these quantities, it is possible to set limits for road roughness. It is theoretically possible to assume any desirable vehicle response power spectrum and, using the vehicle transfer function, determine the road roughness power spectrum.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p229-36
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HS-026 646

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT

A dynamic analysis of the vehicle-road system is provided, using the theory of stochastic processes, including the vibrations transmitted from the roadbed to the tractor-semitrailer and the dynamic forces at the tire-road interface. The tractor-semitrailer vehicle is treated as a discrete, linear, time-invariant, dynamic system subjected to a stationary random input from the road surface. The vehicle model, including primary and secondary suspension systems, and subject to both heave and pitch motions, has six degrees of freedom. A representation of random roughness of the road is given, frequency domain analysis is applied, and a parametric study is presented. Results of the computer analyses are presented in two forms: the amplitude spectra and the root mean square amplitudes which are used to predict vehicle ride quality and to evaluate design concepts. The effects of suspension spring and damping characteristics, tire spring characteristics, and vehicle speed on the vehicle dynamic response and road-vehicle interaction are demonstrated.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p237-55
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HS-026 647

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD

The tractor-dolly-trailer system and its load are modeled, and equations of motion are derived for analyzing the steady-state behavior of the tractor-semitrailer system under different load, steering input, and speed conditions. Calculations are presented for a typical vehicle system under different loading conditions. The strong influence of the specific type of load (solid or liquid), degree of loading (maximum load or unloaded), and load distribution upon vehicle handling characteristics is demonstrated, as well as the strong dependence of the vehicle behavior on the frequency of harmonic steering corrections and on steady-state speed.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p256-64
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HS-026 648

AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION

Stability criteria are examined in a vehicle assumed to have two degrees of freedom (lateral and yaw motions) with constant forward speed and steer angle. It is shown that the boundary of the stability domain (domain of attraction) can be synthesized by generating two sign definite potential functions satisfying Zubov's partial differential equation. A computer algorithm is developed to accomplish a numerical solution. It is inferred that all limits of unit impulse force and couple-vectors belong to the bounding surface of the domain of attraction. The limit of wind gust intensity and its effect on the stability of vehicle motion are discussed as an example.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p265-82
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HS-026 649

THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES

Methods for the objective description and evaluation of vehicle control dynamics are discussed, especially vehicle response to steering input. Objective analysis entails numerical expression of steering control behavior and desirable ranges for vehicle dynamic parameters. The theoretical background of suitable methods for determination of vehicle parameters from measured time functions is presented. Some results of practical applications using time histories measured in open-loop tests are given; these applications concern single vehicles, as well as car-trailer combinations. Proprosals for simplification and unification of the described methods are presented. It is noted that yaw transfer function (gain factor, numerator time constant, damping ratio, and natural frequency) parameters on tested vehicles covered a wide range of values and that relationships could be determined between these parameters and subjective judgments of driveability.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p283-300
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HS-026 650

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY

Theoretical and experimental studies have been made of the steering control quality of two different vehicles during lane change maneuvers. In the first vehicle, the weight was increased, and the weight distribution changed between the front and rear axles. The air pressure in the rear tires was reduced at various stages in the second vehicle. The experimental tests comprised measuring of vehicle characteristics, subjective rating of steering control quality, and measuring the performance of the driver-vehicle system in terms of following a designated course. Results show that there is a strong relationship between yaw velocity response time, steering wheel angle gradient, steering torque gradient, and subjective rating. It was shown that yaw velocity response time is the dominant factor, greatly influencing steering control quality in transient steering maneuvers, with relatively high lateral acceleration.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p301-19
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HS-026 651

THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE

The influence of steering system and vehicle response characteristics on driver performance was investigated under both simulated and actual driving conditions. Simulator characteristics were matched to those of the full-scale vehicle with respect to steering torque gradient, control sensitivity, and lateral acceleration response time; identical disturbance signals were applied in each facility. The influence of torque gradient was accentuated in the simulator and at low levels of control sensitivity, with high levels of torque gradient producing smaller steering wheel and vehicle motion deviations. The effect of control sensitivity on steering wheel deviations was accentuated under actual driving conditions and for slower response times. A greater improvement in lateral position deviations with increased control sensitivity was also noted for the slow response time configurations. Overall the two facilities showed a high degree of correspondence at the different matched settings. The results also indicate that vehicle parameters must be investigated in combination in order to determine their effect on driver-vehicle performance.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p320-33
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HS-026 652

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES

A new theoretical treatment of the straight line stability of motorcycles is provided. It was developed from previous treatments, and involves elaboration of the tire models employed. In the absence of adequate experimental data for motorcycle tires, the taut string analogy is utilized as a basis for estimating tire dynamic properties following lateral or yaw disturbances, and recent results allow better modeling of the responses to camber. Empirical fitting to the lateral and yaw responses leads to the establishment of a linear, constant coefficent set of equations of motion, from which stability characteristics are found by standard procedures. Results are included to show the importance of the various facets of the tire model. The results show that the more elaborate tire modeling effects significant changes in predicted stability characteristics. In particular, the predicted damping of the wobble mode is reduced, which may well bring better agreement between theory and experiment. The effects are not dramatic, indicating that conclusions of previous studies using simpler tire representations should be, for the most part, valid. Modeling and experimental study requirements are proposed.

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Publ: HS-026 629, "The Dynamics of Vehicles on Roads and on Tracks. Proceedings of 5th VSD-2nd IUTAM Symposium," Lisse, Netherlands, 1978 p334-42
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HS-026 653

DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS

The use of controlled DC electromagnetic suspension systems for passenger-carrying vehicles poses a number of special problems, such as interaction through vehicle dynamics and different control loops, noncyclicity of the system, and the choice of weighting matrices for high-order systems. In order to develop synthesis procedures for active feedback systems, it is necessary to consider static and dynamic interactions between various degrees of freedom such as roll, pitch, yaw, lift, and lateral displacement. In addition to stability requirements, other characteristics associated with vehicle dynamics must be considered, such as ride comfort, suspension stiffness, operating speed and air gap, and effects of vehicle-guideway interaction. Different methods of designing feed-back control systems have been studied. A principal problem has been shown to be cross-coupling and interaction between controllers; methods of achieving dynamic decoupling have been indicated. It has been shown that the weight of the vehicle can be distributed to obtain a large zone free from natural frequencies; this will have practical significance in the choice of natural frequencies of the various suspension stabilization control systems. A flexible chassis has been shown to increase suspension system stability as well as ability to handle warped tracks. Active feedback of relative position, absolute velocity, and absolute acceleration to meet ride comfort criteria and stability, as well as flexible chassis, offers promise for both high- and low-speed applications.

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VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY

A dynamic analysis is provided of wheel-rail forces in an individual axle-driving system of a diesel locomotive after the creep-slip adhesion boundary has been exceeded. A seven degrees-of-freedom model represents a rigid car body, a bogie frame, primary and secondary suspensions, a resilient wheel, and an axle-hung traction motor. For this model, the linearized characteristic of the traction motor for the specific speed range and experimentally-measured creep-slip characteristics are assumed. The resulting equations of motion were solved for a particular driving system via computer. It was found that the main influences on the magnitude of the wheel-rail forces after the creep-slip transition were the value of the damping coefficient, the ratio of moments of inertia, the slope of the electric motor characteristics and the slope of the creep-slip characteristics. There exists a limiting value of the damping coefficient of an axle-driving system for which the magnitude of the wheel-rail forces are negligible and no self-excited vibrations in the driving system can occur. Theoretical predictions were found in good agreement with experimental results.

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HS-026 655

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM

The tendency towards slipping and the various phenomena occurring during slipping of locomotives are considered. Calculations and experiments show that the slipping process depends on the value as well as the speed characteristic of the frictional coefficient. The friction-slip relationship as expressed by Mensutin (1960) is used in the present analysis. Types of slipping processes (creep-slip, rapid slip, increasing "chattering" leading to "runaway" slip, and "chattering" slip) are discussed. Statistical characteristics of the random value of friction are mentioned. The slipping probability is analyzed of locomotives of conventional and innovative design (undulatory current, three-phase, and electrohydraulic drives). The influence on slipping probability of locomotive body and bogie spring suspension is considered, as well as that of velocity. Structural formulae for the slipping behavior of conventional and developmental locomotive drives are provided and discussed. The advantages of three-phase and electrohydraulic drives, and research results on their slipping behavior are also discussed.

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HS-026 656

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE

The improvement of diesel combustion systems by facilitating fuel air mixing rate via an increase in the fuel injection rate is explored. After reviewing relevant aspects of fuel air mixing and developing a parameter to correlate experimental data, the discussion focuses on combustion system response to increased fuel injection rate. Experimental responses of selected diesel combustion systems are based on the use of research engines and production-type multicylinder diesel engines with a naturally aspirated or a turbocharged rating. The maximum useful rate (MUR) concept is defined as the value of the fuel injection rate above which there is no further reduction of the brake specific fuel consumption, smoke, or carbon monoxide values. This rate is an important feature of combustion systems and, by definition, is independent of changing legislative targets for fuel economy and emissions. Data on mixing patterns of direct injection (DI) and indirect injection (IDI) engines, MUR values for different engines, optimum fuel injection rate, and computer model calculations of fuel economy show there are marked differences in the response of the combustion system to an increase in the fuel injection rate for swirl-type DI diesel engines. This is probably due to differing degrees of liquid fuel impingement on combustion chamber walls, resulting from various air inlet ports, air motion, and corresponding best nozzle configuration. For non-impingement conditions, there is a maximum useful injection rate beyond which no further reductions of smoke and carbon monoxide occur while nitrous oxides continue to increase. For engines operating with impingement, MUR values are reduced. The overall optimum injection rate for practical applications is less than the MUR and is a complex function of targets for gaseous and noise emissions and the response of the combustion system to fuel injection rate and fuel injection timing. Computer model calculations show that the achievement of short burn times to improve engine cycle efficiency introduces a penalty of increased convective heat loss as the rate of fuel air mixing is increased. Calculations also indicate relative cycle efficiencies to be expected in the high swirl mixing system of the IDI engine, the conventional swirl DI engine, and an adiabatic engine. In practice, low injection rates must be used to satisfy emission and other requirements. Engines with a high swirl rate and impingement give superior retardability for normal injection rates.

by G. Greeves
Lucas CAV Ltd., London, England
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Availability: SAE

HS-026 657

TWO WAYS TO BOOST A LIGHT DUTY DIESEL

Because light-duty diesels are often criticized for their poor specific power, boosting is proposed to improve performance, fuel consumption, noise, and emissions. The naturally-aspirated light-duty diesel is an attractive alternative to the gasoline engine because of its inherently better economy. It suffers considerably when compared to the gasoline engine, however, due to its poor specific power output. In addition to the best-known device for boosting diesel engines, the turbocharger, is another device, the pressure wave supercharger. Tests were conducted in which a turbocharger and a pressure wave supercharger (Comprex) were applied to the same light-duty vehicle to compare relative merits of the two systems. The Opel Rekord 2100D was the test vehicle, and a 1977 car equipped with a standard manual transmission served as the baseline vehicle. Measurements were made of acceleration time, gaseous emissions, fuel economy, and noise levels. Various other measurements, such as mechanical loading, thermal loading, and durability, were also carried out. The turbocharger enabled the diesel to give performance similar to its gasoline equivalent while retaining fuel economy and emission advantages. Problems of transient response and cost hinder its application. The Comprex permitted improved transient response and produced performance comparable to gasoline engines. Available machines remove initial problems associated with noise, installation, and drive. Cost, transient emission, and transient fuel consumption disadvantages need to be resolved. Both turbocharging and pressure wave supercharging systems can benefit from the use of ceramic components to reduce cost. Details on the test vehicle are appended.

by M. L. Monaghan
Ricardo Consulting Engineers Ltd.
Rept. No. SAE-790038 ; 1979 ; 14p 5refs
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Availability: SAE

HS-026 658

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE

Differences in fuel consumption between an 0.1 m bore indirect injection (IDI) diesel engine having a rated speed of 2,800 rev/min and a direct injection (DI) engine of similar specification were investigated. The objective was to identify, isolate, and quantify different sources of fuel efficiency loss. Consideration was given to such factors as increased heat transfer from the combustion system, gas pumping and resultant pressure difference between combustion chambers, different injection timing, and different fuel burning rate schedule. A mathematical model was derived to examine thermodynamic and fluid mechanic aspects of an IDI engine relative to a DI engine. This model was based on a two-zone system (main and prechamber), and experimentally-derived heat release schedules were used for the 0.1 m bore engine with a Ricardo Comet Vb prechamber. Principal loss sources, in order of importance, were a difference in the heat release rate schedule, increased heat transfer loss, later injection timing, and gas pumping through the connecting passage. At full load, 2,200 rev/min with representative injection timings for IDI and DI engines, the superiority of the DI engine amounted to 14% in terms of thermal efficiency. Additional study of airflow, fuel injection, air-fuel mixing, and combustion in main chambers and prechambers is recommended. Information on engine specifications and instruments used in the investigation is appended.

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HS-026 659

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE

The in-cylinder flow pattern of a direct injection (DI) diesel engine under motored conditions and its effect on engine performance when using different intake port designs were studied. Hot wire anemometry was utilized to analyze three different inlet port designs having the same swirl number (two helical ports and one tangential port). The flow investigation and engine tests were carried out at a typical compression ratio of 18:1 using a standard combustion bowl in the piston and produceable inlet ports. Motoring conditions in flow measurements covered the speed range from 1,100 to 2,400 rpm. Using probes located on the piston, a two-dimensional flow field including turbulence was established throughout the entire cycle. In-parallel engine tests were conducted with the ports in question to obtain performance, smoke, and gaseous emission data and to link engine test data with in-cylinder flow data. Certain air motion characteristics within the bowl were essential for the magnitude of exhaust smoke and for combustion efficiency (fuel economy). Smoke was mainly controlled by velocity and turbulence in the center of the combustion bowl. Combustion efficiency was primarily controlled by the tangential velocity (local swirl number) on the periphery of the combustion bowl. Helical ports generally exhibited quantitatively higher in-cylinder flow parameters at lower and higher engine speeds than the tangential port. Procedural aspects of the study are described in appendixes.

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Rept. No. SAE-790040 ; 1979 ; 31p 26refs
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HS-026 660

POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY

Techniques for identifying fuel economy opportunities of powertrain matching are described. Federal Corporate Average Fuel Economy (CAFE) standards requiring an industrywide improvement of 53% between 1978 and 1985 pose a formidable task for the automotive industry, compounded by increasingly stringent emission standards. To meet the challenge, efforts are being concentrated in the following areas: vehicle/engine downsizing; improvements in powertrain component efficiencies; improvements in vehicle aerodynamics and rolling resistance; and powertrain matching. Powertrain matching tasks can generally be accomplished by vehicle/component testing (combining past experience with an iterative test program), computer simulatio (utilizing semiempirical mathematical models of vehicle and powertraining components to project fuel economy, performance, and emission tradeoffs), and computer simulation/vehicl testing (using computer modeling to screen alternatives to be evaluated during a vehicle/component test program). Fuel economy opportunities due to better powertrain matching are discussed, including optimum engine sizing, torque converte matching, transmission gear ratio spacing and shift schedulin axle ratio, and vehicle weight effect. An emission projectio technique based on time weighted engine speed/load point generated by experiment or analytical models is used to quantif fuel economy and emission tradeoffs. Recommendations to im prove the flexibility of computer models concern the development of a user-oriented engine model, a generalized cold start model, a tire dynamics model, and a drivetrain dynamics model.

by Lawrence T. Wong; William J. Clemens
Ford Motor Co.
Rept. No. SAE-790045 ; 1979 ; 12p 4refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 661

REVIEW OF THE AUTOMOTIVE TORQUE CONVERTER

Fluid dynamic investigations were performed on a three-element automotive torque converter using computer solutions successfully applied in the design of gas turbines. With the aid of numerical solutions, surface velocities were computed along the reactor blade based on a two-dimensional flow field. These velocities were computed for an existing reactor blade and a proposed blade with a shortened axial chord. The reduced chord was intended for a more compact coverter circuit design. Diffusion factors and exit fluid angles of the short chord design were maintained within limits of the existing long chord design. Based on an approximation of the three-dimensional flow field, a computer program for the design of centrifugal impellers was modified for application to impellers with axial flow discharge, such as used in converter circuits. Results indicated the presence of negative and highly nonuniform velocities in the impeller. If negative velocities or backflows can be removed and more uniform velocity gradients maintained, higher energy efficiency should result. The use of gradually curved blading and recontoured shell and core shrouds are suggested as areas for further study.

by Robert A. Mercure
Department of Energy, Div. of Transportation Energy Conservation
Rept. No. SAE-790046 ; 1979 ; 14p 10refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 662

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION

The single-rail shift overdrive (SROD) four-speed manual transmission was designed to incorporate reliability and durability characteristics of a totally enclosed, nonadjusting single-rail shift mechanism while maintaining the conventional four-speed shift pattern. An additional objective was to optimize fuel economy with 3.3-liter, 4.1-liter, and 5-liter engines while maintaining acceptable vehicle performance and emission levels. Test vehicles were a Fairmont, Zephyr, Mustang, Capri, Granada, and Monarch (model year 1979). Design studies were conducted to determine the range of gear ratios possible and bearing loads. Extensive tests were made to assure engineering acceptance and customer satisfaction and reliability. These tests concerned high mileage proving ground durability, vehicle shift cycle durability, hot rod shifting, driveline impact and shock, dynamometer fatigue, powertrain bending and resonant frequency analysis, noise, shift efforts, gradeability and drivability, temperature and lubrication compatibility, and satisfaction of government restrictions and safety standards. A three-phase testing approach was successfully implemented to launch the SROD transmission. Supplier production problems were minimized, vehicle assembly plant installations were practically faultless, and customer approval of the transmission's function was acceptable. Procedures used to attain design objectives and satisfy performance requirements are detailed.

by William D. Campbell; Richard A. Petts
Ford Motor Co.
Rept. No. SAE-790047 ; 1979 ; 8p
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 663

NEW 7.5- AND 8.5-INCH FORD AXLES FOR 1979

Two new axles for the 1979 model year and beyond have been developed by the Ford Motor Company to improve fuel efficiency and performance. In addition to fuel efficiency and performance benefits, advantages of the axles are improved reliability, manufacturing flexibility, complexity reduction, common axle ratios, and low ratio capability. Referred to as the 7.5-inch axle and the 8.5-inch axle, both are designed to be interchangeable where torque capacity permits. They share the following design features: cast center sections with cast upper control arm bosses for four-link suspension; cast iron shims and automatic selection equipment; tube assemblies with S-shaped suspension brackets for lower control arm and shock absorber mounting; circular companion flange; form-in-place cover gasket; and axle ratio capacity of 2.06:1 to 3.55:1 on the 7.5-inch axle and 2.26:1 to 4.10:1 on the 8.5-inch axle. The cast center axles, introduced in Ford and Mercury full-size cars, represent a major achievement in fuel efficiency. They are lightweight and reliable and offer improvements in manufacturing flexibility and complexity. A detailed description of axle design, accompanied by illustrations, is presented. Results of the axle design verification program are reported.

by Denis J. Manduzzi; Paul E. Bak
Ford Motor Co., Powertrain and Chassis Product Engineering
Rept. No. SAE-790048 ; 1979 ; 11p
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 664

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES

Automobile flywheel energy storage and drive systems were the focus of a 4-year research effort to improve city gasoline mileage and performance with no degradation in emission standards. Problems arise in the automotive application of a flywheel to manage energy between a prime mover and a load. Flywheel energy management propulsion (FEMP) concepts indicate energy from passenger vehicle engines can be produced using an auxiliary energy storage device such as a flywheel to store excess energy not required to drive the vehicle. When the energy store is full, the engine can be decoupled from the driveshaft which is propelled by stored energy. The FEMP system is useful only for urban operation. Experimental study of flywheel concepts at the University of Wisconsin were based on two computer simulation techniques: continuous numerical integration where a driving cycle was subdivided into time increments of 0.1 second or less and variables (energy loss, fuel consumption, and distance traveled) were derived from totaling incremental values; and a driveshaft torque-speed matrix where a table was developed for each driving cycle to give the amount of time spent at various driveshaft-speed-torque conditions. In an experimental flywheel car, a 2.3-liter 4-cylinder Ford Pinto with a manual shift transmission, the engine on-off parameter was controlled by the driver. Most FEMP system losses during the city driving cycle were produced by the continuously variable transmission. The experimental car demonstrated a 50% mileage improvement over a corresponding production vehicle. It is concluded that FEMP concepts essentially involve a vehicle's transmission, where improvements can greatly enhance fuel economy. With continued research, gains of 100% appear feasible. The theory of flywheel energy management concepts is discussed.

by Andrew A. Frank; Norman H. Beachley
University of Wisconsin, Madison, Wis.
Rept. No. SAE-790049 ; 1979 ; 15p 16refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 665

PLANNING FOR AUTOMOTIVE ELECTRONIC INSTRUMENTATION

Factors to consider in developing automotive electronic instrumentation products are discussed, with reference to marketing study findings. Defining future market size, growth, competitive position, and effect on existing products is one of the electronic planner's most difficult tasks. The stage for automotive electronic instrumentation has been set by electronic calculators and digital watches in the home consumer market. Widespread acceptance of these products by the public, coupled with price reductions after introduction, has led to a significant growth market. As new vehicles are downsized and less reliant on styling changes, electronic instrumentation will play a greater role in enchancing the competitive posture of vehicles. In planning for automotive electronic instrumentation products, consideration must be given to such factors as the existence of a market, product variable costs, investment costs, reliability, human parameters, and regulatory requirements. Automotive electronic instrumentation product offerings in the United States and Europe are noted.

by Robert A. Mazzola
Ford Motor Co.
Rept. No. SAE-790056 ; 1979 ; 6p
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 666

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING

Automobile technology was the topic of a May 1979 White House meeting attended by government officials and automobile manufacturers. Representatives of Ford Motor Co., American Motors Corp., General Motors Corp., and Chrysler Corp., were present, along with President Carter, Secretary of Transportation Brock Adams, Secretary of Energy James Schlesinger, and other Federal officials and White House aides. The meeting primarily focused on transportation and energy and the importance of inventing a car that will use less gasoline. President Carter indicated that government and the automobile industry should collaborate in the formation of a research strategy. Secretary Adams discussed safety and energy features of two new research safety vehicles and reported on his trip to Belgrade, Yugoslavia, where he spoke to European ministers of transport. A report cited at the meeting, prepared by DOT'S Transportation Systems Center in Cambridge, Mass., identified seven areas with the greatest potential for advanced automobile technology: thermodynamics, combustion, and fluid flow; energy storage; engine-fuel interactions; materials science and processing; control systems; structures; and friction and wear.

by Richard Shea
Publ: Transportation USA v5 n4 p4-5 (Summer 1979)
1979
Availability: See publication

HS-026 667

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]

New Jersey highway accident statistics for 1978 are presented. Tabulated data categorize accidents according to number of highway lanes, traffic volume, and mileage. Statistics are presented concerning total accidents, injury accidents, fatal accidents, number of injuries, and fatalities. Detailed tables provide information on type of highway (2, 3, 4, or 6 lanes; divided, no control of access; divided, full control of access; and variable, change in highway type within municipality). Accidents are reported by route, county, and municipality.

New Jersey Dept. of Transportation, P.O. Box 101, Trenton, N.J. 08625
1979 ; 55p
Availability: Corporate author

HS-026 668

STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES

A survey was made of road curvature, superelevation, gradient, and number and distance from the roadway of roadside hazards at 300 sites of fatal crashes into fixed objects, and at 300 comparison sites 1.6 km (1 mi) from each accident site in Georgia. More than 26% of fatal crash sites and only 8% of comparison sites had road curvature greater than 6 degrees combined with downhill gradient of -2% or less at or approaching the sites. Fifty percent of fatal crash sites and only 23% of comparison sites were at or near curves greater than 6 degrees irrespective of gradient. A state study found that only 22% of roadways in Georgia had curvatures of more than 5.5 degrees. Nonlocal roads accounted for 83% of the fatal crashes into fixed objects but comprised only 33% of the roads in the state. In 98% of the cases, objects struck were within 15 m (50 ft) of the pavement edge. Top priority should be given to modifications of roadside hazards on and near curves greater than 6 degrees, particularly those on nonlocal roads where the downhill grades are -2% or less.

by Paul H. Wright; Leon S. Robertson
Georgia Inst. of Tech.; Insurance Inst. for Hwy. Safety, Washington, D.C.
Publ: HS-024 793 (TRR-609) "Highway Safety, Traffic Records, and Law Enforcement," Washington, D.C., 1976 p1-8
1976 ; 14refs
Sponsored by Insurance Inst. for Hwy. Safety.
Availability: In HS-024 793

HS-026 669

EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS

In 1971, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) initiated a program to support centers designed to extend and improve the treatment and rehabilitation services available for problem drinking drivers. These centers were located at selected Alcohol Safety Action Program (ASAP) sites of the National Highway Traffic Safety Administration. A preliminary evaluation is made of the clients provided services at these sites. Demographic data, various drinking-related measures, a self-esteem index, and financial and employment status variables were obtained for the large sample of clients who received service from May 1973 through Mar 1974. Clients were classified into five groups and were compared: DWI (driving while intoxicated) probation, DWI school, DWI non-AC (alcoholism center) treatment, DWI AC treatment, and non-ASAP. The results indicated that for all programs for which follow-up data were obtained the percentage of clients who abstained from alcohol increased, the amount of absolute alcohol consumed per day decreased, behavioral impairment caused by drinking decreased, and self-esteem improved. Although a trend for an increase in financial status was observed, further follow-up study is needed for confirmation. Treatment outcome was more successful with clients showing less involvement with alcohol, which supports the NIAAA premise that is the basis for its support of ASAP programs: ASAP programs include a large number of individuals for whom early intervention into their alcohol problems would be worthwhile.

by Nathan Rosenberg; Donald G. Patterson; David M. Promisel; Leland H. Towle
National Inst. on Alcohol Abuse and Alcoholism
Publ: HS-024 793 (TRR-609) "Highway Safety, Traffic Records, and Law Enforcement," Washington, D.C., 1976 p11-7
1976 ; 4refs
Availability: In HS-024 793

HS-026 670

ECONOMIC ANALYSIS OF ALCOHOL SAFETY COUNTERMEASURES

This analysis determined the potential for successful implementation of each of seven alcohol countermeasures in terms of cost effectiveness and provided baseline information for the National Hwy. Traffic Safety Administration to use in research fund allocation for the development of countermeasures. The countermeasures included the sober pill, self-tester, evidential roadside tester, noncooperative breath tester, alcohol safety interlock system, continuous monitoring device, and operating-time recorder. A set of benefit/cost ratios was calculated for each, and sensitivity analyses were performed on the crucial assumptions and key elements of costs and benefits to test their impact on the ratios. The potential for successful implementation was assessed on the basis of the benefit/cost ratios, and social, technological, and legal feasibility. All seven countermeasures are either in the conceptual or experimental testing stages of development. The sober pill would be cost-effective if single doses cost 25 cents and if it effectively reduced BAC (blood alcohol concentration) level by 0.04% to 0.05%. Self-testers would be cost-effective if users did not drive 75% of the time that their BAC levels were 0.10 or greater. Evidential roadside and noncooperative breath testers would be cost-effective if they deterred 1% to 2% of trips by persons with a BAC of 0.10 or greater. The alcohol safety interlock system would be cost-effective if a device could be developed that had at least 50% effectiveness at a 0.10 or greater BAC, was tamperproof, and required minimal maintenance and installation cost. The continuous monitoring device would be cost-effective if drivers who have the device abide by the warning 50% to 60% of the time. The operating-time recorder would be cost-effective if it were 50% to 60% effective in eliminating trips made with a 0.10 or greater BAC during restricted hours.

by William Shepherd Moore
General Res. Corp., Dept. of Economic and Social Systems, McLean, Va.
Publ: HS-024 793 (TRR-609) "Highway Safety, Traffic Records, and Law Enforcement," Washington, D.C., 1976 p18-23
1976 ; 8refs
Sponsored by National Hwy. Traffic Safety Administration.
Availability: In HS-024 793

HS-026 671

ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES

Recent studies have shown that the enactment of strong laws and the stringent enforcement of those laws by the courts and police have not been empirically proved as effective measures for reducing accidents caused by excessive drinking and driving. A multifaced alcohol countermeasure program is needed to significantly reduce the number of deaths and serious injuries caused by alcohol-related crashes. The problem of drinking and driving can be brought to a manageable level if all of the facilities and services available to states and communities are used. The concept of administrative adjudication, the handling of traffic offenses through an administrative or quasi-judicial approach, has gained widespread attention and is in use in some jurisdictions. The administrative adjudication of first-offense drivers charged with driving while intoxicated would increase the arrests and convictions of drunken drivers, and would lead to early identification of existing or potential alcoholics, with the possibility of leading them to proper treatment or education programs.

by Marvin H. Wagner
M. H. Wagner and Co.
Publ: HS-024 793 (TRR-609) "Highway Safety, Traffic Records, and Law Enforcement," Washington, D.C., 1976 p24-30
1976 ; 29refs
Availability: In HS-024 793

HS-026 672

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)

A study was undertaken to determine if specific treatments on a section of NC-55, a two-lane, rural roadway in North Carolina, could extend the halo effect (i.e. the effect on driver behavior beyond the point and time when enforcement is applied). A VSI (visual speed indicator) sign display, a control treatment in which the VSI sign was covered and no patrol unit was present, and three other static (radar device) enforcement techniques (speed-check zone, parked patrol car, and speed enforcement scene) were utilized. It was found that the use of the three enforcement techniques substantially and significantly reduced the mean, median, and 85th percentile speeds in the vicinity of the enforcement unit. All three techniques significantly reduced (almost eliminated) the percentage of vehicles traveling faster than 88.5 kph (55 mph) and also increased the percentage of vehicles traveling slower than 72.4 kph (45 mph). All three techniques reduced the variability of speeds at the enforcement location. The VSI sign had no significant effect on vehicle speed and was no substitute for actual enforcement activity. The halo effect began to disappear 305 m (1000 ft) past the enforcement treatment and was completely gone at a point 3.2 km (2 mi) downstream.

by Olin K. Dart, Jr.; William W. Hunter
Louisiana State Univ.; University of North Carolina, Hwy. Safety Res. Center
Publ: HS-024 793 (TRR-609) "Highway Safety, Traffic Records, and Law Enforcement," Washington, D.C., 1976 p31-3
1976 ; 4refs
Availability: In HS-024 793

HS-026 673

ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)

A study was undertaken to determine whether there was a causal relationship between the reduced number of traffic accidents and fatalities in Arizona in 1974 and the 88 kph (55 mph) speed limit. Every accident occurring on segments of Interstate, U.S., and state highways that had previously posted maximum speed limits in excess of 55 mph was analyzed. It was found that driver and vehicle characteristics did not affect the 1974 reduction in fatal accidents, but that traffic-related environmental factors influencing driving conditions and travel patterns changed between 1973 and 1974. All categories of accidents decreased in 1974. The number of fatal accidents and the number of total accidents had the highest relative decrease on Interstate highways. Interstate highways that had speed limits of 120 kph (75 mph) in 1973 had the largest decrease in total accident rates. Non-Interstate highways that had speed limits of 104 kph (65 mph) in 1973 had substantially smaller decreases in injury, property-damage-only (PDO), and total accident rates than those on Interstate highways. It is concluded that the reductions in fatal, injury, PDO, and total accident rates (removal of the effect of travel variations) are attributable to the reduction in speeds and the greater uniformity of speeds within the traffic stream. The reduction of fatal accidents in the study accounted for over 92% of the total reduction in statewide fatal traffic accidents in 1974.

by Benjamin E. Burritt; A. Moghrabi; Judson S. Matthias
Arizona Dept. of Transportation; Arizona State Univ., Dept. of Civil Engineering
Publ: HS-024 793 (TRR-609) "Highway Safety, Traffic Records, and Law Enforcement," Washington, D.C., 1976 p34-5
1976 ; 1ref
Availability: In HS-024 793

HS-026 674

RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY

The dramatic increase in the use of pickup trucks and vans prompts an inquiry into vehicle performance and safety. Because pickups and vans do not belong to the passenger car category, they are exempt from many Federal safety regulations governing automobile components. The annual production of pickups increased by 32.5% between 1970 and 1975. There was a 62.7% increase from 1976 to 1977. Corresponding figures for vans were 122% (1970-1975) and 37% (1976-1977). Vehicle production data were combined with scrap rate information to estimate the number of pickups and vans in use. Related accident involvement and fatalities were obtained from the Fatal Accident Reporting System for 1977. Compared to passenger cars, pickups have a considerably higher accident involvement rate but only a slightly higher fatality rate. Vans are involved in accidents nearly as often as passenger cars but have a lower fatality rate. These variations are probably due to different vehicle use patterns. Analysis of two-vehicle collisions reveals that pickups and vans seem to perform somewhat better than passenger cars on a scale designed to reflect gross safety aspects. Vans appear to be associated with a disproportionate number of single-vehicle accidents involving pedestrians and bicycles, due to possible heavier use in densely populated urban areas; pickups are more often used in rural areas. Although data indicate that pickups and vans are not less safe than passenger cars, additional study is warranted to resolve issues regarding use patterns and vehicle occupant protection.

by James O'Day; Richard J. Kaplan
Publ: HSRI Research Review v9 n5 p1-6 (Mar-Apr 1979)
1979
An earlier version was presented at the SAE Congress and Exposition, Detroit, 1979, as SAE-790378.
Availability: See publication

HS-026 675

IMPROVING ANTI-ROLL PROPERTIES OF SEMITRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS

Eliminating the free play in leaf spring assemblies is one way of significantly reducing the rollover potential of tractor-semitrailers. The rollover threshold can be reduced by 10% to 15%, which is significant because the lash space permitting free play is present in suspensions of most U.S. semitrailers and in many rear axle assemblies of heavy trucks and road tractors. Dynamic tests and computer simulations indicate that suspension free play contributes to roll instability when a vehicle changes direction quickly enough to unload springs on one side of the vehicle. Free play can be inexpensively eliminated or greatly reduced by installing a bolt beneath the leaf spring or by filling the lash space beneath the spring with a rubber bushing. It is estimated that a 15% improvement in the roll stability of tractor-semitrailers can potentially reduce the incidence of rollovers by 40%. While the total number of heavy vehicle rollovers per year is not high, such accidents often pose serious safety hazards for other vehicles. The free play elimination technique is illustrated.

by Robert D. Ervin
Publ: HSRI Research Review v9 n5 p7-8 (Mar-Apr 1979)
1979
Availability: See publication

HS-026 676

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS

Side impact collisions were analyzed using information extracted from the National Highway Traffic Safety Administration's 1977 Fatal Accident Reporting System (FARS) files and information from the National Crash Severity Study (NCSS). The comparative study was designed to assess the value of FARS data in accurately depicting a particular type of accident. In 1977, FARS data showed 7,902 occupants in passenger car accidents involving side damage. These accidents were classified as rollovers, two-vehicle collisions, and single-vehicle collisions. Statistics were obtained on the number of in-vehicle fatalities, the mean age of fatally-injured occupants, the percent of male occupant fatalities, the mean vehicle weight, and the percent of occupant fatalities using some form of restraint system. Data in the NCSS were obtained from a sample of towaway passenger car accidents in the 38 contiguous States. For passenger cars struck in the side, the total number of occupants in NCSS regions was 13,302. The population variable was used to extrapolate information from NCSS accident records in estimating national figures. An expected fatality rate was calculated, fatalities from the FARS divided by total estimated crash occupants from the NCSS for each crash configuration of interest. The overall fatality rate for side impact collisions was calculated as 1.45 fatalities per 100 crash occupants. Highest fatality rates involved cars struck by trucks or fixed objects; lowest fatality rates involved cars struck by other cars. Occupants of cars struck in the side by trucks or fixed objects constituted 30% of all occupants in side impact collisions but 50% of all fatalities. Side door strength is important in preventing fatal injuries by minimizing intrusion into the passenger compartment. This anti-intrusion measure is most effective when a car is struck by another car, but even the best side door strength can eliminate only a portion of fatalities involving vehicles hit by large trucks or fixed objects.

by James O'Day; Richard J. Kaplan
Publ: HSRI Research Review v9 n5 p9-17 (Mar-Apr 1979)
1979 ; 8refs
Availability: See publication

HS-026 677

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT

The Motor Vehicle Manufacturers Assoc. Two-Dimensional Crash Victim Simulator is a mathematical model used for predicting occupant dynamics in a crash environment. The computer model is large and complex. Its many options and features provide the automotive safety engineer considerable flexibility in defining a crash event but at the same time impose considerable demands for specification of input data. As a means of facilitating learning to use the model, the Tutorial System combines a Self-Study Guide and an Audio-Visual Program. Both are divided into 13 segments, called "modules", each of which deals with the data requirements of a set of related model features. Each audiovisual module consists of 35 mm slides and approximately 20 minutes of narration on a tape cassette. Module topics include an introduction, the body linkage, neck and shoulder models, contact surfaces attached to the occupant and those attached to the vehicle, generation of occupant contact profiles, occupant positioning in the vehicle, crash deceleration profiles and head applied forces, belt and air bag restraint systems, energy-absorbing steering columns, model operation, and example crash simulations. Tutorial System documentation is in two volumes. The Self-Study Guide consists of text, illustrations, and example problems. The Audio-Visual Program includes the narration text and figures used for the 35 mm slides.

by Bruce M. Bowman; D. Hurley Robbins; Robert O. Bennett
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-77-18-1; PB-289 406 ; 1977 ; 418p 13refs
Availability: NTIS

HS-026 678

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION

Tonic activity of smokers and nonsmokers was investigated by correlating alpha frequencies of electroencephalogram (EEG) activity under conditions of smoking and smoking deprivation with alcohol consumption. The primary interest was in dominant alpha frequency as a measure of cortical response to alcohol, but alpha amplitude was also examined to evaluate the effect of smoking on alcohol-induced changes in EEG'S. Subjects included 35 male university students, nine of whom were nonsmokers. Fourteen smokers, assigned to the smoking deprivation condition, were required to abstain from smoking for 15-18 hours. The remaining subjects were permitted to smoke in their usual manner. Each subject participated in alcohol and nonalcohol sessions spaced seven days apart and conducted at the same time of day. Alcohol (95% Analar-grade ethanol) at a dose level of 0.65 g per kg of body weight, diluted to a 20% solution, produced a blood alcohol concentration (BAC) ranging from 0.07% to 0.08% about 30-50 minutes after ingestion. Smoking in both alcohol and nonalcohol sessions was controlled at a constant inhalation rate of once every 30 seconds during four 5-minute periods. Tobacco smoking prior to and/or during alcohol consumption counteracted the alcohol-induced slowing of alpha frequencies observed in nonsmokers and deprived smokers. Alpha amplitude did not differentiate among nonsmokers, deprived smokers, and nondeprived smokers, nor did alpha amplitude exhibit changes immediately after smoking. Alcohol and nonalcohol sessions showed no significant difference in alpha amplitude change scores. Failure to find any significant tobacco-induced BAC alterations suggests that the observed alcohol-tobacco antagonism occurs in the central nervous system. Further study of both tonic and phasic aspects of physiological activity is recommended to clarify alcohol-tobacco interactions and the importance of tobacco in alcohol consumption.

by Verner J. Knott; Peter H. Venables
Publ: Journal of Studies on Alcohol v40 n3 p247-57 (1979)
1979 ; 29refs
Availability: See publication

HS-026 679

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT

Sixty-six diesel-powered taxicabs and an equal number of gasoline-powered taxicabs were operated for 120,000 miles in New York City to compare fuel economy and exhaust emissions. Actual road records of fuel use were analyzed. For a select group of taxicabs, laboratory measurements of fuel economy and exhaust emissions were obtained. Fuel economy was assessed based on accumulated mileage and fuel use per shift. Data for fuel economy and exhaust emissions were also derived from dynamometer testing in accordance with the Environmental Protection Agency's Federal Test Procedure and from computer simulations of the Modified Urban Cycle (average speed of 10.5 mph instead of 11 mph). Flat operating conditions were similar for diesel and gasoline taxicabs. Comparative analysis indicated diesel taxicabs had 50% better fuel economy than gasoline taxicabs on the road and that diesel exhaust emissions (hydrocarbons, carbon monoxide, and nitrogen oxides) were lower than gasoline exhaust emissions. Emissions from gasoline taxicabs increased appreciably with vehicle age, while diesel emissions did not degrade significantly. Measured diesel particulates were at a low level, as demonstrated by opacity readings of the exhaust stream. Information on the structure of magnetic tape records used in data collection is appended.

by K. M. Hergenrother
Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. UMTA-MA-06-0066-79-1; DOT-TSC-UMTA-79-30 ; 1979 ; 31p
Rept. for Jun 1976-Apr 1979. Prepared for Urban Mass Transportation Administration.
Availability: NTIS

HS-026 680

DEATH AND INJURY ROAD ACCIDENTS IN NORTHERN IRELAND 1978

Statistical data are compiled on fatal and injury-producing traffic accidents in Northern Ireland in 1978, including accident causes and culpable road users. These accidents increased by 2.2% (a total of 5437) and casualties by 2.9% (a total of 8080), but fatalities decreased by 18.8% (355 in 1977 to 288 in 1978). Motorcycle casualties decreased 7.6% from 1977. The number of motor vehicles registered during 1978 increased by 3% to almost 430,000 vehicles. During 1978, one person was killed in every 19 accidents; the 1977 ratio was 1:15. The 288 fatalities occurred in 267 accidents; the principal causal factors were as follows: drivers, motorcyclists, pedalcyclists at fault (171 accidents); pedestrian at fault (71); road and weather conditions, animals, other obstructions, and passengers at fault (15); and defective vehicles or equipment (10). The most common violations by the drivers and cyclists were excessive speed for conditions, and driving under the influence of alcohol or other drugs. The most common pedestrian factors were disregard of traffic when crossing the roadway, and being under the influence of alcohol or other drugs. Defective brakes or tires were the most common vehicle defects. Ice, frost, or snow were the most common environmental factors implicated in these fatal traffic accidents.

Royal Ulster Constabulary, Traffic Div. Headquarters, Alexander Rd., Belfast, Northern Ireland
1979 ; 52p
Cover title: Royal Ulster Constabulary Road Traffic Accident Report 1978.
Availability: Her Majesty's Stationery Office

HS-026 681

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)

This law enforcement equipment guide contains information on the selection and maintenance of high-speed patrol car tires. Pursuit tires, i.e., those certified for speeds up to 125 mph (200 km/hr), represent a significant portion of a police department's transportation budget. Properly selected and maintained tires can save money and improve the safety and performance of patrol cars. Tire selection and maintenance guidelines are provided, focusing on maximum safety, tire life, and performance. Particular attention is paid to application factors (type of road, pursuit driving, tire maintenance, hazard exposure, type of tire, tire mileage, snow tires, and radials versus snow tires); technical factors (construction, tire markings and materials, use of chains, and tires and gasoline mileage); cost and performance factors, (braking traction, cornering traction, driving traction, and endurance and tread wear); operational factors (mounting tires on wheels, inflation pressure, radial run-out, balancing and alignment, safety precautions, break-in, inflation and loading, road conditions, driver habits, and mechanical condition of vehicle); and maintenance factors (inflation checks, tire rotation, detection of faults, mixing and matching tires, position of least worn tires, abnormal tread wear, and repairs and servicing). Data on tire interchangeability, load and inflation, and mixing, and on Federal regulations pertinent to vehicle tires, are appended.

by Alvin C. Lewis; Ernest Lewis, Jr.
National Bureau of Standards, Center for Consumer Product Technology, Washington, D.C. 20234
Rept. No. NBS-SP-480-33 ; 1979 ; 44p 12refs
Sponsored by National Inst. of Law Enforcement and Criminal Justice, Washington, D.C. 20531.
Availability: GPO $2.00, stock no. 003-003-02073-7

HS-026 682

WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT

A system is described for surveying truck gross and axle weights in an undetected manner with signals from traffic sensors and instrumented strain gauges on bridge girders. A derived weight prediction algorithm filters out the dynamic components of bridge response and obtains the equivalent static axle weights by a least square error minimization. Accurate predictions require the truck dimensions and velocity obtained from traffic sensors. Signals from the traffic and strain transducers go directly to a minicomputer located in an instrument van underneath the bridge for digitizing and placing on a magnetic tape. An operator is needed to press a button to alert the system to the number of axles of an approaching truck. At the present developmental stage, the system is configured so that the magnetic tape is processed in the laboratory using a digital computer. Details discussed include field operation and installation, theoretical considerations, computer programs, test results, and further modifications of the system to permit the field minicomputer to predict weight in real time and to allow routine system use by highway departments. Documentation manuals have been prepared with more detailed descriptions of the use of the system and its fabrication and assembly.

by Fred Moses; Matthew Kriss
Case Western Reserve Univ., Dept. of Civil Engineering, Cleveland, Ohio 44106
DOT-FH-11-9042
Rept. No. FHWA-RD-78-81; CE-78-1 ; 1978 ; 86p 17refs
Rept. for May 1976-Jun 1978.
Availability: NTIS

HS-026 683

COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT

Four demonstration projects involving vanpooling, currently being sponsored by the Dept. of Transportation Service and Methods Demonstration Prog., are described and compared in terms of organization and operation. The projects in San Francisco, Calif., Minneapolis, Minn., Knoxville, Tenn., and Norfolk, Va., all involve third-party providers and multiple employment locations. A comparison is made of management and administration, target group focus, marketing procedures, driver and rider application and selection procedures, van acquisition and provision arrangements, and financial aspects, such as cost structures, driver lease fees, passenger fares, and project funding.

by Carla Heaton; Jesse Jacobson; James Poage
Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
PPA-UM-27
Rept. No. UMTA-MA-06-0049-79-6 ; 1979 ; 114p
Rept. for Apr 1978-Mar 1979. UMTA/TSC Proj. Evaluation Series.
Availability: NTIS

HS-026 684

TRAFFIC CONTROL DEVICES, VISIBILITY, AND GEOMETRICS

Traffic signs and signals, visibility, and safety are considered in this compilation of 17 papers. The papers cover such topics as a prototype delineation system for installation on concrete median barriers, yellow-on-brown road signs, nonsignalized traffic control at low-volume intersections, signing warrants for nonservice facilities, sign performance under dew and frost conditions, relation between sign luminance and specific intensity of reflective materials, daytime high-visibility aids for motorcyclists, signalization of high-speed isolated intersections, relation between lighting parameters and transportation performance, driver vision, roadside hazards, two-way left turn lanes, selection of median treatments for arterial highways, relation of highway design consistency and systematic design to highway safety, lateral displacement phenomena, and accidents (two-lane rural roadside, urban utility pole).

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-681 ; 1978 ; 101p refs
Includes HS-026 685--HS-026 701.
Availability: Corporate author $5.40

HS-026 685

EVALUATION OF DELINEATION SYSTEMS FOR THE NEW JERSEY BARRIER

A prototype delineation system for installation on the New Jersey type of concrete median barrier is described. In system development, environmental factors affecting delineator performance were identified. The relation was assessed between environmental factors (weather conditions, dirt accumulation, wear from windblown particles, glare from opposing traffic, and destructive forces) and experimental variables (type of reflective device, vertical position on barrier, and mounting materials and techniques). As weathering or exposure time increased, the relative brightness of one reflector with a convex glass lens increased to the point that it was rated as the brightest after two winters of exposure. The top-side vertical position showed slightly less reduction in reflectivity than the bottom-side vertical position. It was hypothesized that dirt and debris channeled down the side of the barrier by natural wind or the slipstream wind of vehicles accounted for the much greater wear and dirt covering on side-mounted reflectors. Visibility of reflective devices improved during wet nighttime conditions. Delineator effectiveness diminished when there was opposing headlight glare. The most durable mounting technique was a butyl adhesive pad attached to a low-profile marker. Further research to explore the role of delineation systems in highway safety is recommended.

by William L. Mullowney
New Jersey Dept. of Transportation
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p1-6
1978 ; 2refs
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 686

EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)

Aesthetic, visibility, and legibility factors associated with the use of yellow-on-brown information signs in New York's Adirondack Park were studied. Signs were installed on an experimental basis along a reconstructed State highway segment in 1976. The aesthetic appraisal consisted of photographic documentation and a driver opinion survey. Actual test signs were selected for legibility and visibility evaluation. Study findings revealed that driver parameters of age, sex, driving experience, and visual acuity were not related to differences in performance among sign background colors (brown, blue, and green). The sample included few inexperienced drivers and few over 60 years of age. About 80% of drivers favored the use of yellow-on-brown signs, and color photographs confirmed the importance of background color in sign visibility. All sign-color combinations were legible beyond the accepted standard of 50 ft/in (6 m/cm) for letter height during daylight. Differences in legibility and visibility among colors were small but statistically significant in some cases. It is concluded that widespread use of yellow-on-brown information signs can enhance the appearance of Adirondack Park highways without affecting highway safety or motorist convenience. In 1978, the Federal Hwy. Administration agreed to a variance permitting yellow-on-brown highway signs in Adirondack Park.

by Gary F. Gurney; Earl D. McNaught; James E. Bryden
New York State Dept. of Transportation
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p6-9
1978 ; 6refs
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 687

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)

The most efficient signing policy for traffic flow through low-volume unsignalized intersections was investigated. Computer algorithms were used to study fuel consumption, exhaust emissions, and travel time. Probability of conflict techniques, used in conjunction with accident records, supported the safety portion of analysis. Two validated simulation aides were required, a traffic model sufficiently detailed to reproduce flow characteristics of low-volume unsignalized intersections, and a program to process traffic simulation output on an individual vehicle basis and estimate fuel consumption and resulting emissions. The Environmental Protection Agency model for emissions (nitrogen oxides, hydrocarbons, carbon monoxide, and carbon dioxide) and the Urban Traffic Control Simulation model of the Federal Hwy. Administration permitted statistical comparisons. Gasoline use was a function of control type implemented at intersections.

Restrictive control caused a significant increase in carbon monoxide emission. A highly significant difference in minor street travel time or delay was demonstrated for different control types. Energy savings were attributed to a policy that emphasizes yield signs and no sign control rather than a policy of stop signs at low-volume intersections with adequate sight distance, and it was determined that few accidents can be expected to occur at typical low-volume intersections regardless of what form of control is installed.

by Dana L. Hall; Kumares C. Sinha; Harold L. Michael
Mitre Corp., McLean, Va.; Purdue Univ.
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p10-2
1978 ; 7refs
Prepared for 57th annual meeting of Transportation Research Board. Sponsored by Hwy. Extension and Res. Project for Indiana Counties (Purdue Univ.).
Availability: In HS-026 684

HS-026 688

SIGNING WARRANTS FOR NONSERVICE FACILITIES (ABRIDGMENT)

Warrants used by 49 States for nonservice facility signing on expressways and freeways were reviewed. The study was conducted in 1975-1976, and information on 14 types of nonservice facilities was requested (amusement parks, zoological or botanical parks, stadium sports facilities, colleges and universities, recreational or cultural facilities, airports, industrial areas, central business districts, bus terminals or stations, bus park-and-ride lots and carpool lots, rail terminals or stations, roll-collecting highways and bridges, health care facilities other than hospitals, and government facilities). States were asked whether they signed for each facility on expressways and freeways and whether they had any written warrants or criteria for this function. Of the 49 States, 46 indicated they made a distinction between the use of actual and categorical terms in the warrant process. Most warrants were of a specific or quantitative nature and were grouped according to the following facility criteria: location relative to the highway; level of activity; size or capacity; traffic generation; availability; ownership; public services and attraction value; population range of surrounding area; and placement and number of signs. Warrants should involve specific criteria. Major items of concern should be the first three criteria mentioned above and population of the surrounding area. Guidelines developed by the American Assoc. of State Hwy. Officials to facilitate traffic generator signing are presented.

by William L. Mullowney
New Jersey Dept. of Transportation
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p13-6
1978 ; 1ref
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 689

PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)

The effect of dew and frost on the nighttime legibility of traffic signs in the central part of Kentucky was investigated. Thirty-one nights with observed natural dew or frost formation between 9:00 p.m. and midnight were selected to evaluate several possible combinations of retroreflective legend and background materials under headlight illumination. Test procedures varied according to prevailing atmospheric conditions. Observations and photographs were normally made at 1-hour intervals. Sign positions were interchanged (left to right) at the midpoint of the study. Under direct headlight illumination from 91.44 meters and with natural dew formation conditions at the sign face, the performance of encapsulated lens retroreflective sign materials was superior to that of enclosed lens materials and equal (for light dew) or superior (for heavy dew) to button copy. Under the same viewing conditions but under frost formation conditions, the performance of button copy was superior to that of other test materials. Viewed from a position laterally offset 1.8 meters from the light source, encapsulated lens materials and button copy were almost identical in performance under frost conditions. Viewed from greater lateral offset distances, all other test materials were superior to button copy under both dew and frost conditions. Button copy legends exhibited the most noticeable degradation in performance over time under dew and frost conditions, presumably due to aging (weathering) and/or accumulation of dirt film. Decreases in sign legibility and target value caused by dew and frost formation were more pronounced on plywood-backed sign panels than on plain aluminum panels. The performance of all combinations of sign materials appeared to be less affected by frost than by dew. Under normal atmospheric conditions and signing practices, it is estimated that 50% to 80% of adverse effects associated with dew and frost can be overcome by using encapsulated lens signing materials.

by John W. Hutchinson; Ted A. Pullen
University of Kentucky; Kentucky Dept. of Transportation
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p16-20
1978 ; 12refs
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 690

RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS

A simple means of translation was explored to aid in the proper selection and application of materials where traffic sign luminance is desired. Determinations of nighttime sign luminance were made from the driver's eye position in a standard-sized passenger automobile with carefully selected normal headlamps. Measurements were made on a smooth tangent roadway using a laboratory telephotometer at distances of 600 and 300 feet. Reflective samples were mounted in typical sign positions, representing specific intensities in silver-white, yellow, orange, red, and green colors. The two observation angles common to most highway specifications, 0.2 and 0.5 degrees at -4 degree entrance angle, were used to determine a broad luminance span. Readings on the test road were correlated by linear regression. Resulting equations established the relation between sign luminance and the specific intensity of reflective materials according to distance, sign, and headlamp position. These equations permit the computation of sign luminance or specific intensity for any type of reflective sheeting.

by W. P. Youngblood; H. L. Woltman
3M Co., St. Paul, Minn.
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p20-4
1978 ; 14refs
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 691

EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS

A survey of consumer attitudes toward such conspicuity aids for motorcyclists as jackets, vests, sleeves, and slipovers was conducted, and the effectiveness of conspicuity aids in facilitating motorcyclist detection was considered. Comments are tabulated on 19 options, as well as user ratings, chromaticity and unit cost. Many pieces of high visibility clothing had serious design problems and were strongly criticized by motorcyclists. Most fluorescent materials exhibited a strong tendency to lose both color and fluorescence in a relatively short time. The time taken to detect a motorcyclist wearing a conspicuous color was inversely related to the projected area of color. Neither the wearing of high visibility clothing nor the daytime use of headlights affected motorist gap-acceptance behavior.

by Norman Ashford; P. Stroud; C. Kirkby; N. S. Kirk
Loughborough Univ., England
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p24-34
1978 ; 9refs
Prepared for 57th annual meeting of Transportation Research Board. Sponsored by Transport and Road Res. Lab. (England). Includes discussion by Samuel P. Sturgis (Liberty Mutual Res. Center), R. G. Mortimer (University of Illinois at Urbana-Champaign), and Paul L. Olson (Highway Safety Res. Inst.).
Availability: In HS-026 684

HS-026 692

SIGNALIZATION OF HIGH-SPEED, ISOLATED INTERSECTIONS

Various detector-controller designs for high-speed isolated traffic intersections were examined. At signalized intersections where approach speeds are 35 mph (56 km/hr) or higher, drivers face a so-called dilemma zone. If the yellow signal comes on while the driver is in this zone, the decision to stop may result in a rear-end collision or a sideswipe. The opposite decision, to go through the intersection, may produce a right-angle accident. For such an intersection, the traffic engineer needs to select a detector-controller configuration that detects an approaching vehicle before it enters the dilemma zone and adjusts the green signal to provide safe passage through the zone or to warn the vehicle upstream of the zone in time to provide adequate stopping distance. A new detector-controlled design is proposed, utilizing an actuated nonlocking controller, an 85-foot (25-meter) delayed-call loop detector at the stopline, and two extended-call detectors upstream to give protection to the dilemma zone. Knowledge of dilemma zone boundaries is reviewed. Detectors and controllers are classified, a taxonomy of detector-controller configurations is presented, and research data on the effectiveness of green extension systems are summarized.

by Peter S. Parsonson
Georgia Inst. of Technology
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p34-42
1978 ; 13refs
Prepared for 57th annual meeting of Transportation Research Board. Based on research sponsored by Federal Hwy. Administration. Includes discussion by Jon D. Clark (Kentucky Dept. of Transportation) and author's closure.
Availability: In HS-026 684

HS-026 693

RELATION BETWEEN LIGHTING PARAMETERS AND TRANSPORTATION PERFORMANCE

The relation is addressed between technical requirements for road traffic lighting (geometry and photometry) and functions of safety, speed, comfort, and cost, with emphasis on safety considerations. The chain between cost and effectiveness, i.e., transportation performance or accident reduction, is broken down into the elements of costs and related installation parameters on the supply side, and road traffic and transportation performance on the demand side. For good road lighting, the supply should equal or exceed the demand. In terms of existing vs. required conspicuity level, the supply should equal or exceed the demand. The supplied conspicuity level can be derived from installation parameters by well-established methods. A similar derivation of the required conspicuity level from traffic and transportation performance requires additional research. The traditional method, in which one or two standard visual tasks are postulated as representative of driving, is unsatisfactory and may cause erroneous results. Further detailed research on lighting parameters is recommended.

by D. A. Schreuder
Netherlands Inst. for Road Safety Res., Voorburg, Netherlands
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p43-7
1978 ; 30refs
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 694

REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)

The ability of vision tests to identify drivers likely to have traffic accidents is discussed. In 1967-1968, visual measurements involving 17,500 California drivers were made and the results were compared with 3-year driving records which included over 5,200 accidents. Findings revealed weak but statistically significant correlations between various vision scores and driving records. The best vision test for predicting accidents was the dynamic visual acuity test in which the observer had to resolve detail in a rapidly moving acuity target. By itself, however, this test was a poor predictor of a driver's accident rate. The ability of static visual acuity, dynamic visual acuity, low-light recognition threshold, glare recovery, and field of vision tests to identify drivers likely to have accidents, without paying an unacceptably high penalty in the rejection of good drivers, is questionable. Visual performance of older drivers may merely reflect their effective or phenomenal age, and another factor, such as deterioration of the brain's central processing capacity, may be the basic cause of increased accident rates. Improving visual performance may not improve a driver's accident rate. Even though a visual performance measure is not causally related to accident rate, its predictive power may still be valuable in screening or in establishing visual standards. Investigation of contrast sensitivity, movement perception, and hazard perception tests and other stimulus conditions for the potentially effective glare recovery test is recommended.

by Brian L. Hills; Albert Burg
Transport and Road Res. Lab., Crowthorne, England; Univ. of California, Los Angeles
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p47-50
1978 ; 5refs
Prepared for 57th annual meeting of Transportation Research Board. Research sponsored by the Public Health Service, the State of California, and the Bureau of Public Roads.
Availability: In HS-026 684

HS-026 695

ROADSIDE HAZARD MODEL (ABRIDGMENT)

A study was designed to identify and quantify parameters associated with single-vehicle fixed-object accident severity and probability and to incorporate these parameters into a hazard model. Field surveys identified numerous hazardous objects adjacent to the roadway, including drainage facilities, traffic signal supports, and utility poles. The initial structure of the roadside hazard model incorporated seven mathematical terms: relative hazard of a particular object; normalizing constant; distance of an object from the road edge; prevailing speed of traffic; severity index associated with type of object; traffic volume; and geometric conditions. Parameters subsequently quantified in the model were distance, speed, severity index, traffic volume, and geometrics. A computer program was used to calculate a hazard index for 8,424 combinations of speed, object, distance, and geometric parameters in accordance with traffic volume. An examination of the top 150 hazard indexes for wide rural roads with an average daily traffic level of 8,000 vehicles revealed that 45% of entries had speeds of 88 km/hr. Vehicle location on the outside of curves was dominant. No objects more than three meters from the road edge appeared in the list of the 150 indexes, and most on the list were within 1.5 meters. Application of the hazard model to evaluate remedial actions and to rank hazards is discussed.

by Jerome W. Hall; Thomas E. Mulinazzi
University of New Mexico; Univ. of Maryland
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p50-3
1978 ; 9refs
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 696

MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS

A macroscopic study of off-road accident, road, and traffic flow characteristics on the rural two-lane trunkline road system in Michigan was conducted to aid the Department of State Highways and Transportation in developing priority programs for roadside hazard improvement. Based on statewide accident data for the 1971-1974 period, a macroscopic modeling effort was initiated for 270 two-mile sections of homogeneous two-lane road with widely varying road and traffic conditions. Road data came primarily from an analysis of the department's photolog files. Multiplicative models for different groups of average daily traffic were developed in which restriction on passing sight distance, number and length of curves, and length of road exposed to obstacles were primary explanatory variables. These models, evolved dynamically with the aid of statistical computer programs, were tested for validity. They explained as much variance as would be expected assuming a Poisson accident frequency distribution. Study findings indicate that a small number of causal variables can be combined in a multiplicative model to explain variations in accident frequency on rural two-lane roads. Such a model is applicable to the identification of locations with a high probability of frequent off-road accidents, and of locations where additional factors may be at work and engineering study is needed.

by Donald E. Cleveland; Ryuichi Kitamura
University of Michigan, Dept. of Civil Engineering
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p53-62
1978 ; 11refs
Prepared for 57th annual meeting of Transportation Research Board. Sponsored in part by Michigan Dept. of State Highways and Transportation. Includes discussion by John C. Glennon (consultant), Thomas E. Mulinazzi (University of Maryland), and authors' closure.
Availability: In HS-026 684

HS-026 697

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE

Research was carried out to obtain information on continuous two-way left-turn median lanes and to evaluate the effectiveness of such lanes as an access control measure. A questionnaire was sent to transportation engineers; of 90 mailed out, 70 were returned from individuals in 36 states and one Canadian city. Primary areas of interest were the effect of the lanes on traffic safety and flow characteristics, and conditions conducive to lane installation. Respondents stated that two-way left-turn median lanes work well despite non-uniformity in signing and marking methods. There was uniform agreement that the lanes have excellent safety records; specifically, head-on collisions are extremely rare. It was concluded that lane effectiveness and public reaction depend on proper engineering. Attention should be paid to future access needs and through traffic volumes before the final selection of an access control method. A step-by-step decisionmaking strategy for the implementation of two-way left-turn median lanes is outlined.

by Zoltan Anthony Nemeth
Ohio State Univ., Dept. of Civil Engineering
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p62-9
1978 ; 18refs
Prepared for 57th annual meeting of Transportation Research Board. Sponsored by the Ohio Dept. of Transportation, and the Federal Hwy. Administration.
Availability: In HS-026 684

HS-026 698

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS

A cost-benefit comparison of median treatments for arterial highways is reported that covers accident reduction, delay reduction, and construction cost. Median treatments represent an important means of reducing accidents and delay on urban arterial highways. Five common median treatments are two-way left-turn lanes, continuous left-turn lanes, alternating left-turn lanes, raised median dividers with left-turn deceleration lanes, and median barriers with no direct left-turn access. The result of comparative analysis is a selection guide for use by designers in determining the optimal median treatment for an arterial highway based on geometric and operational conditions. A table summarizes cost-benefit analysis findings in the form of a selection guide for median treatments and construction options.

by Douglas W. Harwood; John C. Glennon
Midwest Res. Inst., Kansas City, Mo.
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p70-7
1978 ; 15refs
Prepared for 57th annual meeting of Transportation Research Board. Sponsored in part by Federal Hwy. Administration.
Availability: In HS-026 684

HS-026 699

HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY

A systematic highway design approach to meet driver needs is proposed. Consideration is given to the evolution of highway design, "objectifying" the design process, design consistency in relation to driver expectancy, and developing a cost-effectiveness methodology. Although publications of the American Assoc. of State Hwy. and Transportation Officials provide a unique framework for geometric design, they do not examine geometric design as a systematic process. A systems engineering design approach emphasizes the total design or task rather than the efficiency of component parts, and strives to maximize system performance at a given cost level or to minimize system cost at a given performance level. Objectifying the design process requires: a format for functionally classifying highways and a framework for defining highway design goals in each functional class; an objective description of driver, vehicle, traffic, and environmental characteristics; a definition of design speed as a function of design goals and constraints for each functional highway class; an objective delineation of design criteria; and synthesis. Synthesis of data on interactive relations must incorporate hazard measures, data matrixes, and statistical procedures. Six countermeasure approaches to driver guidance and control problems are to improve driver detection, increase driver perception and response time, eliminate "false cue" designs, decrease driver guidance and control demands, increase driver expectancy, and build "relief valve" designs. The decision process associated with cost-effectiveness assessment is detailed, and the need for sophisticated analysis and decisionmaking procedures is emphasized.

by John C. Glennon; Douglas W. Harwood
Midwest Res. Inst., Kansas City, Mo.
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p77-88
1978 ; 10refs
Prepared for 57th annual meeting of Transportation Research Board. Includes discussion by Sally Free (Center for Auto Safety), C. William Gray (Ohio Dept. of Transportation), and authors' closure.
Availability: In HS-026 684

HS-026 700

ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)

The problem of urban utility pole accidents was explored, using 1975 data on these accidents and other run-off-road accidents in 20 urban-suburban areas. It was established that utility poles were the most frequently struck and among the most aggressive roadside objects. When factors differentiating utility pole accidents from other single-vehicle accidents were examined, few differences were noted in variables describing the vehicle, the driver, or environmental conditions. Differences were detected in variables describing road characteristics, vehicle departure attitude, and characteristics of utility pole placement. It is clear from regression analysis that the overriding factor in predicting utility pole accidents is the number of poles. This variable not only identifies that a line of poles exists but also indicates average pole spacing since poles within 183 meters of either side of the struck pole were counted. If better measures of vehicle departure attitude were available (e.g. angle and speed), a higher proportion of variation in results might have been explained.

by Ian S. Jones; A. Stephen Baum
Calspan Corp., Buffalo, N.Y.
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p89-92
1978 ; 1ref
Prepared for 57th annual meeting of Transportation Research Board.
Availability: In HS-026 684

HS-026 701

MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)

Data were collected to explain lateral displacement phenomena using two super 8-mm movie cameras to study the behavior of traffic in the right lane of freeways as it approaches a vehicle parked on the right shoulder. Vehicles of different sizes were placed on the right shoulder at varying distances from the freeway edge of the pavement. Two observers each operated a camera, one stationed on a crossover above the center of the freeway right lane and another stationed evenly with the parked vehicle on the other side of the freeway. Both films were later advanced simultaneously through stop-action projectors, and several parameters were extracted by visual counting or the construction of special scales placed on the screen to measure distance. Parameters included total volume of vehicles in the right lane including trucks and buses, distance between pavement edge and center of the traveling vehicle as it passed the parked vehicle, speed of individual vehicles in the right lane and adjacent lane, and headways in the right lane. Data were classified as geometric or traffic characteristics. Because each urban area had its own geometric and traffic characteristics, it appeared that general mathematical models are not feasible in analyzing lateral displacement.

by Ali A. Selim; James L. Josey
South Dakota State Univ.; Clemson Univ.
Publ: HS-026 684 (TRR-681), "Traffic Control Devices, Visibility, and Geometrics," Washington, D.C., 1978 p92-4
1978 ; 3refs
Prepared for 57th annual meeting of Transportation Research Board. Sponsored by Univ. of Missouri at Rolla, Civil Engineering Dept.
Availability: In HS-026 684

HS-026 702

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL

An assessment was made of the extent to which evaluation within the Dept. of Transportation (DOT) is an established part of the management process and the extent to which evaluation activities are aimed at serving congressional and executive branch decision-making needs. The following activities are recommended to the Secretary of Transportation: to continue DOT initiatives to develop a Departmental Program Monitoring and Evaluation System, including the formulation of DOT-wide guidelines for evaluation; to review specifications and measurements used in evaluating departmental program objectives, and to develop a means for clarifying objectives and measures with the appropriate congressional committees, the Office of Management and Budget, and agency officials; and to establish an evaluation planning process based on priority transportation objectives identified by DOT, the Congress, and others. Evaluation activities of the Office of the Secretary of Transportation, the Coast Guard, the Federal Aviation Administration, the Federal Hwy. Administration, the Federal Railroad Administration, the National Hwy. Traffic Safety Administration, and the Urban Mass Transportation Administration are separately discussed.

General Accounting Office, Prog. Analysis Div. Washington, D.C. 20548
Rept. No. PB-293 956; pad-79-13 ; 1979 ; 99p refs
Availability: NTIS

HS-026 703

CONSOLIDATED TRANSPORTATION PROGRAM (1978-1982), MARYLAND

Forecasts are presented of Maryland Dept. of Transportation expenditures for operating, constructing, and improving transportation facilities during the period 1978-1982. Highway, transit, port, and aviation capital projects are included, as well as operating programs funded from the Department's Transportation Trust Fund. Complete operational and capital costs for transportation activities for FY 1978 are provided; those for FY 1979 through 1982 are shown for planning purposes only. The Consolidated Transportation Program (CTP) has been developed within the framework of the preliminary Maryland Transportation Plan and is consistent with the policies and the long-range plans described there. The program is based on schedule forecasts, revenue forecasts, and cost estimates which incorporate assumptions of future socioeconomic conditions and trends. The highway section of this CTP constitutes the annual update of the State Primary and Secondary Improvement Programs, which has heretofore been distributed as a separate document.

Maryland Dept. of Transportation, P.O. Box 8755, Baltimore-Washington Airport, Baltimore, Md. 21240
Rept. No. PB-293 505 ; 1977 ; 184p
Availability: NTIS

HS-026 704

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT

The cold-air performance of the baseline power turbine designed for a 112-kilowatt automotive gas-turbine engine has been experimentally determined as part of the Dept. of Energy automotive gas-turbine program. Since this axial-flow power turbine has a variable stator for engine control and braking, performance data were taken at positive-power stator-vane-chord setting angles of 26 degrees, 30 degrees, 35 degrees (design), 40 degrees, and 50 degrees from the plane of rotation and at the nominal braking position of 107 degrees. The overall performance in terms of mass flow, torque, speed, and efficiency is presented, as well as overall diffuser performance and the results of rotor-exit radial surveys. Turbine efficiency increased to a maximum as the stator setting angle increased. For equivalent design speed and a design work factor of 1.172, the maximum total efficiency was 0.87 at the 45 degree setting angle although the total efficiency at the design setting angle of 35 degrees was 0.77. Turbine mass-flow and torque levels increased with increasing setting angle, with the maximum levels at the 50 degrees stator setting angle. At equivalent design speed and a design static-pressure ratio of 1.775, mass flow ranged from 48.5% to 133.5% of design and torque ranged from 33% to 142% of design as the stator was opened from the 26 degree to the 50 degree setting angle. The turbine braking power was determined at a nominal stator setting angle of 107 degrees. At equivalent design speed and static-pressure ratio, equivalent braking power was 10.8% of equivalent design power output. Turbine internal flow characteristics were determined from static-pressure measurements and rotor-exit radial surveys with probes. The rotor-hub reaction was negative for all conditions tested at stator setting angles below 40 degrees. Although the hub stage reaction was -0.160 at the 35 degrees setting angle (design), it was 0.131 at the 45 degrees setting angle (maximum efficiency). Overall diffuser total-pressure-loss coefficients that included both the diffuser and the exit collector were obtained over the range of diffuser-inlet critical velocity ratios tested. The loss coefficient varied from 0.2 to 0.4 as the inlet critical velocity ratio increased from 0.1 to 0.5.

by Kerry L. McLallin; Milton G. Kofskey
National Aeronautics and Space Administration, Lewis Res. Center, Cleveland, Ohio 44135
EC-77-A-31-1011
Rept. No. DOE/NASA/1011-78/28; NASA-TM-78993; N79-17859; E-9775 ; 1979 ; 56p 8refs
Availability: NTIS

HS-026 705

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)

Solid-impact telescopic shock absorbers (silicone-elastomer) mounted horizontally with flanges or rubber-metal connections between a car's reinforced bumper and body have been proven in practice. Reaction forces absorb kinetic energy on impact. The bumper automatically returns to its original position and is ready to absorb impact again. Silicone-elastomer, used as filler for shock absorbers, has special requirements of low shear resistance and high compressibility. The material is liquid in its crude state and is precipitation-hardened using an integrated hardener at high temperature. Advantages of the shock absorber design are high efficiency due to an approximately 90% rectangular diagram, damping forces unaffected between -40 degrees and 70 degrees C, no damage to shock absorber for impact speeds up to 50 km/hr, and functional dimensions with large tolerance ranges that insure small production and performance tolerance ranges. Consideration is given to U.S. regulations requiring a bumper system on passenger vehicles that is capable of absorbing an impact velocity of up to 5 mph or 8 km/hr. The solid-impact shock absorber design is described in terms of static force variation, force variation versus impact stroke during collision, efficiency, temperature behavior, behavior at high and low speeds, long-term behavior, bending load tolerance, and fabrication scatterings. Drawings and diagrams are provided.

by Helge Siegner
Publ: ATZ Automobiltechnische Zeitschrift v81 n5 p229-30 (1979)
1979
Translated from German (original 2p; translation 6p).
Availability: Reference copy only

HS-026 706

THE AUTOMOBILE AND THE ENVIRONMENT: AN INTERNATIONAL PERSPECTIVE

First versions of the six papers presented were written in 1972-1974 for the Environment Directorate of the Organisation for Economic Co-operation and Devel. Among the issues addressed are environmental implications of options in urban mobility, urban public transport, methods of traffic limitation in urban areas, implications of the automobile and the environment on the planning process, strategies for automobiles and cities in developing countries, and automotive air pollution and noise. The text of the papers was adjusted to read logically in 1977; some papers have been updated.

by Ralph Gakenheimer, ed.
Organisation for Economic Co-operation and Devel.
Rept. No. MIT-PRESS-SERIES-IN-TRANSPORTATION-STUDIES-1 ; 1978 ; 505p refs
Includes HS-026 707--HS-026 712.
Availability: MIT Press, Cambridge, Mass.

HS-026 707

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]

Besides pollution control, the rising demand for fuel is another critical problem brought on by the increasing numbers of motor vehicles in circulation. It is recommended that the available reserves be made to go further by reducing motor vehicle weight, adjusting engine design and maintenance, controlling traffic, and cutting back on power-consuming accessories (automatic transmission and air conditioning). Promotion of fuel-efficient automobiles through differential taxes and fuel taxes is also recommended. The relative economy of various forms of transportation should be examined: public transport, public automobile service, carpools, bicycles, and walking. New concepts in public transport service can be achieved by improved bus operations, innovative rail transit systems, car sharing, and selective limitations on private automobile use. Methods of improving bus service include priority at traffic lights, exclusive lanes, and tunnels. It has been found that construction of rapid rail transit without land use controls leads to added traffic congestion. A light railway or semi-metro system adapted from the tramway is considered preferable to conventional underground systems. Among ideas for public automobile service are bus pools (chartered bus service from a single suburban area), shared taxis, subscription carpools with special parking facilities, and "dial-a-ride" service. Among promising new techniques are Personal Rapid Transit (cabins on guideways) and "people movers." Plans to restrict the use of cars must be accompanied by a concurrent investment in public transport, in traffic diversion and management, and in pedestrian facilities. Land use control policies are needed to control the demand for transportation. For the future, it is believed that the automobile and public transport should complement each other within the goals set by city planners, backed by strong initiative and positive action by central governments, including experimentation and demonstration projects.

Publ: HS-026 706, "The Automobile and the Environment: An International Perspective," Cambridge, Mass., 1978 p1-15
1978 ; 3refs
Availability: In HS-026 706

HS-026 708

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY

The present state of development and planning is reported for a variety of recent urban transport initiatives in Western Europe, North America, and Japan. Outlined are the scope of future needs for public transport, the effects of mobility on the urban environment, the planning process, and the roles of government, particularly central government, in dealing with issues of urban mobility and urban environment. Innovations are possible in the incremental advance of existing transport techniques as well as in new technical capabilities. Institutional innovations are required (planning, administrative, and financial). The difficulties of providing improved transport service are centered not in technology but in gaps of communication and responsibility between institutions with transportation missions and those with other tasks (environmental quality, human factors application). Government action can improve urban public transport by overcoming these gaps which limit the understanding, the resources, or the responsibilities necessary to deal with urban transport policy. Among the specific topics discussed are new potentials in public transport service (horizontal elevators, Personal Rapid Transport); bus operations and the management of street and highway facilities (minibuses); tramways, rail rapid transit and suburban railroads; institutional innovations in planning and adminstration; automated guideway transit (small vehicle systems in localized or areawide service); and government and the pace and quality or urban transport evolution. Appended is a discussion of service characteristics of existing modes of urban transport.

by Robert A. Burco
Publ: HS-026 706, "The Automobile and the Environment: An International Perspective," Cambridge, Mass., 1978 p17-129
1978 ; refs
Availability: In HS-026 706

HS-026 709

METHODS OF TRAFFIC LIMITATION IN URBAN AREAS

Methods are reviewed by which traffic volume is limited in every city worldwide, intentionally or unintentionally, by local or central government. Control may be exercised over particular classes of vehicles, in particular areas or streets, at particular times, or for particular purposes. The 35 control methods identified fall into three categories: traffic restriction, traffic restraint, and traffic avoidance. Traffic restriction methods include road closure, prohibitions (e.g. no turns), traffic management, vehicle regulation, and restriction of driver licenses. Traffic restraint methods include reducing traffic speed; designating lanes for buses, cycles or pedestrians; parking restrictions, controls and charges; and other methods of making private transport slower, more expensive, and less attractive. Traffic avoidance relies upon planning control of land use and transport infrastructure; methods include minimizing the need for travel by private motor vehicle, improvement of public transport, and restrictions on road building. It is concluded that effective methods are available to cities for selectively limiting traffic volume as the cities consider appropriate.

by J. Michael Thomson
Publ: HS-026 706, "The Automobile and the Environment: An International Perspective," Cambridge, Mass., 1978 p131-228
1978 ; refs
Availability: In HS-026 706

HS-026 710

THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS

Changing awareness and attitudes concerning such social and environmental factors as air and water quality, noise, natural ecology, open space, and community structure are affecting the construction of transportation systems (new or larger airports, highways, bridges, and transit systems). Among the topics presented in an examination of the implications of this increased environmental awareness are an overall planning objective and strategy, institutional arrangements, decision-making responsibilities, community interaction, evaluation of alternatives, and the interrelation of system and project planning. Basic guidelines are presented for an integrated approach to incorporating social, economic, and environmental factors into transportation decision making. Key findings include the fact that the overall process is as important as the techniques employed; that social equity issues must be explicitly recognized and considered; and that different groups of people have different interests and priorities. It is proposed that all phases of a transportation planning and design process should have the following objectives: to clarify issues of choice; to fully inform decision makers; and to achieve substantial, effective community agreement on a feasible, equitable, and desirable course of action, including adequate compensation for groups who are adversely affected by the course of action. Increased consideration of environmental issues during system planning is recommended, as are individual project decisions formulated according to staged strategic commitments, in order to achieve flexibility to respond to changes in the overall plan.

by Marvin L. Manheim; John H. Suhrbier
Massachusetts Inst. of Tech., Cambridge, Mass.; Cambridge Systematics, Inc.
Publ: HS-026 706, "The Automobile and the Environment: An International Perspective," Cambridge, Mass., 1978 p229-90
1978 ; refs
Sponsored by American Assoc. of State Hwy. and Transportation Officials, California Dept. of Transportation, Federal Hwy. Administration, and Massachusetts Dept. of Public Works.
Availability: In HS-026 706

HS-026 711

AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES

The impact of automobile ownership on major cities is explored, including cities in developing countries. Buses are considered the most effective immediate answer to the problem of traffic congestion; if the number of buses in cities of over a half million population were doubled and priority given to public transit on city streets, 135 million more rides per day could be provided at an investment of $4000 million, less than the cost of new roads or continuing congestion and less than 10% of the cost of equivalent subway capacity. Other alternatives suggested are group-riding taxis or public automobiles (1 taxi as substitute for 6 private cars). Physical constraints on private automobiles include auto-free zones, all-bus streets, and bans on curb parking; financial constraints on automobiles include charges for highway use and parking. Other causes of traffic congestion are the haphazard location and arrangement of urban activities, poor environment, and lack of physical relationship among housing, jobs, and services. Urban redevelopment is recommended that organizes and reduces travel requirements while improving the capacity of public transport. For new urban growth areas, community design and city planning are recommended. Transportation should not be used exclusively to support congestion but to avoid it and to help build satellite communities that are partially self-sufficient. Basic data on cities and motorization in developing countries are appended.

by Wilfred Owen
Publ: HS-026 706, "The Automobile and the Environment: An International Perspective," Cambridge, Mass., 1978 p291-366
1978 ; refs
Availability: In HS-026 706

HS-026 712

AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY

Strategies are considered which enable countries to abate air pollution and noise from motor vehicles. Countries vary in climate and topography, extent of industrialization, and in levels of automobile ownership, but if present trends continue, all countries will be affected to some extent by air pollution and noise, particularly in urban areas. More accurate and more complete monitoring of air quality is needed to obtain information about the extent of the air pollution problem, as well as further research on the health effects of pollutants. Among the topics discussed are vehicle emission and noise standards, the need for uniform test procedures, the effects of major increases in the price of automobiles, effects of emission controls on driving performance and fuel economy, emission controls in the context of other vehicle modifications, controlling emissions from vehicles in use, dual standards for vehicle emission control (higher urban standards), limiting lead content in motor fuel, motor fuel quality, regulatory or economic controls, and controlling air quality and noise by reducing the use of cars. In the longer term, levels of automotive air pollution and noise could be lowered through rational urban and land use planning: shortened distances between home and work, school, and shops. Evolution in vehicle design due to advances in technology is also possible. Increased use of car-carrying trains and plane/rented car package trips could reduce long distance travel by automobile. The extent of future changes depends on the political climate within individual countries. Appended are a review of the literature on the health effects of lead from fuel, tables of national vehicle noise limits and of motor vehicle statistics, and discussions of the technology of vehicle emission and noise control.

Ad Hoc Group to the Environment Com. of OECD
Publ: HS-026 706, "The Automobile and the Environment: An International Perspective," Cambridge, Mass., 1978 p367-494
1978 ; refs
Availability: In HS-026 706

HS-026 713

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING

A distinction is made between urban and freeway driving; fuel consumption at a given constant speed on the freeway is essentially independent of the driver. In two experimental studies, drivers were instructed to drive "other than normally with the traffic" to minimize either fuel consumption or trip time. For each 1% increase (decrease) in trip time compared to normal driving, fuel consumption increased (decreased) by about 1.1%. It was determined that expert drivers can save fuel without increasing trip time by skillfully adjusting their speed to avoid stops at traffic signals and that the formal problem involved in minimizing fuel consumption on an urban trip is so complicated that even a perfect fuel economy meter would not permit a driver to achieve this minimum. Three actions to reduce fuel consumption in urban traffic are suggested: anticipating conditions ahead so that braking is minimized; avoiding stopped delays; and using low acceleration levels. The possible effect of driver behavior on the overall traffic system is discussed.

by Leonard Evans
Publ: Human Factors v21 n4 p389-98 (Aug 1979)
1979 ; 19refs
Availability: See publication

HS-026 714

ALCOHOL AND SPEED-ACCURACY TRADEOFF

Performance on two auditory choice reaction time (RT) tasks was studied in a group of 12 subjects under the influence of graded doses of ethyl alcohol ranging from placebo to 1 g/kg body weight. All subjects had normal hearing and color vision and were light to moderate social drinkers with no medical conditions that contraindicated alcohol consumption. They were instructed to abstain from alcohol and other drugs during the experiment and to fast at least four hours before sessions. The experiment consisted of six sessions on successive days, except for a 48-hour interval following the highest alcohol dose, and consisted of two independent tasks to measure subjects' ability to distinguish direction and pitch of aural stimuli. Deadline procedures were employed in side discrimination and pitch discrimination tasks to calculate the speed-accuracy tradeoff function (accuracy versus RT). The designated deadline was constant within 100 trial blocks. Before each block, the technician stated which deadline was operational. Subjects had to strive for 100% accuracy at the longest deadline, at least 90% accuracy at the middle deadline, and at least 70% accuracy at the shortest deadline. Accuracy declined as a function of alcohol dose, but alcohol did not significantly influence RT. Accuracy was not affected by task, although the pitch discrimination task required about 88 ms more time than the side discrimination task. Alcohol dose and task produced independent effects on the speed-accuracy tradeoff function. As dose increased, the slope of the tradeoff function declined; slopes were equivalent for the two tasks. The x-intercept, where accuracy equaled chance levels, was 90 ms greater for the pitch task than for the side task.

by O. H. Rundell; Harold L. Williams
Publ: Human Factors v21 n4 p433-43 (Aug 1979)
1979 ; 23refs
Availability: See publication

HS-026 715

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]

Eight different configurations and color combinations of rotating beam emergency vehicle lights were evaluated in terms of information conveyed about rate and direction of travel when viewed at night. Lights were viewed moving toward or away from stationary observers at rates of 0, 5, and 10 meters per second for an overall range of 300-450 meters. Observers were 78 males between 19-26 years of age with substantial night driving experience. Each light signal was viewed by an independent nonoverlapping group of 9, 10, or 11 subjects. Each subject viewed 25 exposures of a single light, with five possible conditions (toward fast, toward slow, still, away slow, and away fast) occurring five times. Differences were found between individual lights with regard to motion illusions, signal-to-noise ratios, and overall error scores. Red lights conveyed more information than combinations of red and blue lenses in the same light. Twin lights were superior to single beacons, and twin models with a sequential mirror-generated flash pattern were superior to plain ones. Several lights created an illusion of receding motion when actually at rest. This was most severe for a side-to-side alternate flash pattern using red signals. Highly conspicuous lights were not necessarily those with the best information transfer characteristics. Cues relevant to the perceptual task of the study appeared to be provided by changes in light intensity with distance rather than by changes in angular displacement.

by Jan Berkhout
Publ: Human Factors v21 n4 p445-55 (Aug 1979)
1979 ; 10refs
Availability: See publication

HS-026 716

THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977

Information on the body size of Army personnel, including men and women, has been collected during several anthropometric surveys conducted between 1946-1977. The widespread belief that height and weight of the general population are increasing is not supported by data for Army men and women. Although increases have been found in some body measurements of Army personnel, these changes are slight. Contrasts in body size and proportions between Army men and women are significant in terms of clothing design and the human engineering of equipment and material for use by both men and women. These differences concern sitting and eye heights, shoulder and hip breadths, and arm and leg functional reaches. Survey data are discussed and tabulated.

by Robert M. White
Publ: Human Factors v21 n4 p473-82 (Aug 1979)
1979 ; 11refs
Availability: See publication

HS-026 717

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS

The impact of metrication of roadside speed signs upon vehicle speeds was investigated for four different road types using concealed roadside radar. The study was conducted one year after metrication to determine whether there were any long-term changes in traffic patterns in addition to the short-term influences reported previously. There was no evidence of any tendency for drivers to increase traveled speed, even on the two roads for which metrication resulted in an increase in the speed limit. Analysis of accident statistics for the month following metrication revealed no significant increase in accident rate over that projected from a nine-year record of accident trends. This reflects similar experiences in Australia and India following metrication. It is concluded that highway metrication does not present the safety hazard suggested by critics of the program.

by Michael L. Matthews
Publ: Human Factors v21 n4 p503-7 (Aug 1979)
1979 ; 9refs
Availability: See publication

HS-026 718

THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT

A program was designed to develop a system capable of detecting snow, ice, frost, or slush over a highway bridge deck area greater than 4 x 2 feet (1.2 x 0.6 m) and generate a valid alarm signal to warn motorists of a hazard. The detection system selected was a microwave radiometer operating at 10 GHz which continously samples a reference noise source and internal amplifier noise to provide measurement corrections of radiated power received from the road surface being observed. The principal radiometer components are a rectangular horn antenna, a sensitive receiver, and a signal processor/alarm unit. The successive program phases were: design optimization and system tradeoffs; breadboard model laboratory and field tests; and prototype model design, fabrication and test. Test results on asphalt and concrete roadway simulators, as well as actual asphalt roads, correlated with previously published radiometric temperatures for similar surfaces. The following road conditions were detectable: dry/warm; dry/cold; wet; slush; ice layer (0.1 cm. minimum); and snow layer (1 cm. minimum). All road hazard detection objectives were met except for frost detection. Descriptions of recommended additional effort are presented, including detailed evaluation of the prototype model; advanced alarm logic; self-test techniques; and a scanning antenna to cover increased road areas.

by S. Berinsky; H. K. Hong; T. H. Lee; W. T. Schrader
Lockheed Missiles and Space Co., Inc., P.O. Box 504,
Sunnyvale, Calif. 94086
DOT-FH-11-9328
Rept. No. FHWA-RD-78-203; PB-292 645 ; 1978 ; 155p
Rept. for Sep 1977-Aug 1978.
Availability: NTIS

HS-026 719

DUAL PHASE STEEL PRODUCTION BUMPERS

The use of high strength , low-alloy (HSLA) dual phase steel is an effective method of reducing bumper weight while meeting ever-increasing government performance requirements. A paper analysis, followed by a hardware evaluation, successfully substituted "dual phase" for conventional HSLA steel at a reduced thickness. This steel, basically an annealed vanadium strengthened SAE 980 steel, has a tensile strength of 90 ksi minimum and an elongation of 27% minimum. Bumpers for the all-new 1979 Cadillac Eldorado were designed and released using dual phase steel with yield strengths of 70-80 ksi for the face bars. Production problems were overcome by modifications of mechanical properties and increased development experience with this steel. To achieve the full work-hardening potential of dual phase steel, bumper sections and draw dies must be designed for a uniform strain greater than 3%. Future dual phase steel for bumpers in the 80-120 ksi range is desirable, but further improvements in steel-making technology and part and die design techniques are required to achieve this goal.

by Harvey H. L. Mantey; Fred T. Burton
General Motors Corp., Cadillac Motor Car Div.
Rept. No. SAE-790281 ; 1979 ; 14p 8refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar, 1979.
Availability: SAE

HS-026 720

EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES

Test methods are described for evaluation of lubricants for small air-cooled two-cycle engines used in Japan, and some results are presented. The effect of base oil composition and additive type on lubricant performance is also described. The following conclusions were drawn: composition of base stocks affects piston cleanliness, exhaust port blocking and smoke; polybutene reduces exhaust smoke, but accelerates the formation of tacky film on the piston surfaces. Selected combinations of metallic sulfonate and metallic phenate additives can give good piston cleanliness, further improved by supplementary addition of ashless dispersants. Ashless dispersant, by itself, gives reduction of combustion chamber deposits and of plug fouling, but cannot alone provide satisfactory piston cleanliness and ring stick prevention in air cooled engines. Less than 0.25% of ash content in two-cycle engine oil is desirable for prevention of spark plug fouling and combustion chamber deposits. Overbased detergents, despite low ash concentration, could raise the incidence of plug fouling. Barium type additives act as deposit softeners and reduce piston rings sticking, exhaust port blocking, and combustion chamber deposits.

by T. Maeda; T. Tanabe; Y. Maeda; K. Tamura
Nippon Mining Co., Ltd.
Rept. No. SAE-790076 ; 1979 ; 11p 5refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979
Availability: SAE

HS-026 721

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS

The development of 2-stroke cycle gasoline engines with higher specific outputs and improved environmental aspects has resulted in more stringent lubricating oil requirements. A classification system is being generated by SAE/ASTM/API in cooperation with the Coordinating European Council (CEC) to facilitate selection of suitable oils with different performance levels for various applications. Standardized CEC Test Methods and European in-house tests used for 2-stroke oil development are described and discussed; typical bench and field test results are presented, obtained both with reference oils and with proprietary formulations incorporating modern concepts of base oil and additive technology. Biodegradeable lubricants and special oils for use at lean fuel/oil ratios have been developed. It is concluded that a multi-purpose oil giving optimum performance in all types of 2-stroke engines and under all practical operating conditions is not in sight; it will be difficult to fit marketed oils covering a wide performance spectrum into the proposed API/CEC classification system based on three grades. The 2-stroke engine should nevertheless continue to be valuable as a power unit for a large variety of machines and equipment. Photographs, diagrams and charts are included.

by C. G. A. Eberan-Eberhorst; M. A. Cantab; H. Martin
Deutsche BP Aktiengesellschaft, Hamburg, West Germany;
Societe Francaise des Petroles BP, Paris, France
Rept. No. SAE-790078 ; 1979 ; 26p 19refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 722

FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT--A NEW CHALLENGE

Since today's two-cycle engine oils are not expected to meet future engine oil requirements adequately, it is recommended that oil developers use a Comprehensive Oil Development Plan for future oils. The plan should include five key elements: engine manufacturer contact, mechanism studies and failure analysis, oil formulating, laboratory engine evaluation, and field evaluation. These elements are described through examples of lubrication and deposit programs. The most important future oil performance requirement is considered to be scuffing control. Data from the G15 laboratory engine scuff test are presented, which should assist in the development of future oils. The importance of mechanism studies and failure analysis programs to support formulation for antiscuffing is stressed. A review of published air-cooled engine deposit test procedures has shown the lack of world-wide standardization. Satisfactory water-cooled engine test procedures are available, although the standardized BIA-TCW test needs modernization to increase test severity and the ability to separate oils of different quality. Studies of laboratory engine test procedures show a need for better correlation with field evaluations.

by C. R. McCaffree; R. M. Jacobsen
Chevron Chemical Co.; Oronite Additives
Rept. No. SAE-790079 ; 1979 ; 21p 40refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 723

EMISSION FACILITY DESIGN CRITERIA

A detailed review is presented of the layout and design criteria of the new Oldsmobile emission test facility. This facility represents Oldsmobile's response to the need for new accurate, reliable and versatile emission test facility to accommodate the more stringent Federal and State emission standards. The facility consists of three operational test sites, with capability of future expansion to five, and can test either gasoline or diesel vehicles. Sites provide a dynamometer for preparing cars and two evaporative emission S.H.E.D.'s; precise control of building temperature, humidity and background air quality; and latest state-of-the-art instrumentation for measuring hydrocarbons, carbon-monoxide, carbon dioxide, oxides of nitrogen, oxygen, continuous air/fuel ratio, methane, evaporative emissions, fuel economy, and diesel particulates. Its measurement capabilities, computer data handling, and storage and retrieval processes are discussed, as is a special data reduction program capable of producing two or three dimensional plots of dynamic engine emission parameters. The final section reviews the facility's physical design, data acquisition capability, and computer versatility, permitting updating to accommodate changes in the fast-moving field of emission measurement technology.

by L. G. Feiler, 3rd.; C. E. Wing; J. N. Danzo; T. N. Louckes
General Motors Corp., Oldsmobile Div., Lansing, Mich.
Rept. No. SAE-790081 ; 1979 ; 8p
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 724

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS

Twelve studies are presented, covering the following topics: the effectiveness of roadside signs and traffic signals in preventing accidents and providing information to motorists; a model pedestrian safety program and management of pedestrian traffic in city centers and at the 1980 Winter Olympics; treatment of overpasses and undercrossings for the disabled; and characteristics of bicycle travel, cyclist behavior, and effectiveness of bikeway and bicycle highway systems.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-683 ; 1978 ; 59p 80refs
Includes HS-026 725--HS-026 736.
Availability: TRB $3.40

HS-026 725

RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION

The relation between roadside signs located nearest to urban traffic intersections and traffic accidents was systematically investigated. Specific sign elements studied were total number, type (public vs. private), size, and color. The dependent variable was the number of accidents during 1975 at 60 intersection approaches where the driver who entered the intersection from the direction selected was found to be at fault in the police accident investigation report. The intersections were selected randomly from cross intersections in Austin where at least one accident occurred in 1975. Results indicate that a number of sign elements had a significant relation to accidents at intersections controlled by traffic signals. A wider range of engineering alternatives is needed at some stop-sign intersections to counteract the effects of potential distractors, such as design of a larger or brighter target traffic device or employment of neutral background shields to contrast the target and its surroundings. When such alternatives are not feasible at sites with many distractors, traffic signals should be used instead of stop signs.

by Charles J. Holahan; Michael D. Campbell; Ralph E. Culler; Ceclia Veselka
University of Texas at Austin
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns," Washington, D.C., 1978 p1-3
1978 ; 16refs
Sponsored by the Texas Office of Traffic Safety.
Availability: In HS-026 724

HS-026 726

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)

Two laboratory studies were conducted to evaluate candidate messages for display on an advance-notice road sign, directing drivers to tune in their radios for reception of traffic information. Study 1 investigated the effect of ten candidate messages on 247 subjects in independent groups of about 25 subjects each, using a questionnaire. In Study 2, 40 subjects were asked to select one of a pair of messages that better prepared them to receive the radio message. It was found that when the objective is to imply an urgency to tune to a radio frequency, the word "alert" is most effective; all data suggest that it implies a non-routine, incident-related situation requiring action. Though the word "radio" is implied from the advisory, preference data support its inclusion. Omission of the word "traffic" can result in misunderstanding the message RADIO ALERT. Based on the two studies, RADIO TRAFFIC ALERT is recommended, as well as the statement "TURN TO (frequency number)" or "TUNE DIAL TO (frequency number)." The single word "tune" is well understood. Some uncertainty existed among the subjects as to whether the radio dial number shown was AM or FM.

by R. Dale Hutchingson; Conrad L. Dudek
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p4-5
1978 ; 2refs
Availability: In HS-026 724

HS-026 727

LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)

A field study was made of the legibility of a lamp matrix sign, which generated 46-cm (18-in) characters, to determine legibility distance as well as other display characteristics. The maximum distance was determined at which each of 20 subjects could read three test words. The mean legibility distance for all subjects was about 255 m (840 ft), translating to 5.58 m/cm (46.7 ft/in) of letter height. The 85th percentile legibility distance of a 46-cm matrix sign is about 4.2 m/cm of letter height. The closeness of the corrected static visual acuities of the subject population and the national population and the general agreement between the study mean and previously reported averages further substantiates the results. As the study was limited to only one size of lamp matrix display, generalizations could not be made about other sizes or types of display. Mention is also made of previous field experience showing that the brightness of the lamps used has a considerable effect on legibility.

by William R. Stockton; Conrad L. Dudek
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p5-8
1978 ; 5refs
Sponsored by Federal Hwy. Administration
Availability: In HS-026 724

HS-026 728

REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)

A changeable message signing system for use in diverting vehicles around an incident on a freeway and redistributing traffic on alternate routes was tested and the results analyzed. Freeway maintenance both under management (informational and advisory signs) and nonmanagement (no sign) operations was analyzed on a case study basis. Phase 1 of the studies involved routing traffic along the service road, using matrix signs; phase 2 would route traffic to alternate arterial roads when continuous service roads were not available, using matrix and trailblazer signs, but no incidents of sufficient duration occurred in locations to warrant this procedure. Questionnaires were distributed for evaluation of the information displayed and suggestions for further information. Results showed that in all cases, exit ramp volumes increased for signed (managed) incidents compared to nonsigned (nonmanaged) natural diversion conditions. For informational signs only, increases ranged from 125.9% to 324.7% for the four case studies; when diversion messages were presented, increases ranged from 147.3% to 343.8%. A preference was indicated by motorists for diversionary information. In one case, motorists reentered the freeway before they had cleared the blockage, indicating a need for a supplemental sign or advisory to tell drivers when to reenter the freeway.

by J. Michael Turner; Conrad L. Dudek; James D. Carvell
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p8-10
1978
Availability: In HS-026 724

HS-026 729

PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP

Options are described and evaluated for the location of bus staging areas and the movement of pedestrians between these areas and the Intervale ski jump site at the 1980 Winter Olympic Games at Lake Placid, N.Y. These options are analyzed in terms of impacts on the environment, spectators walking under winter conditions, traffic flow and accidents, cost, maintenance, and post-Olympic implementation considerations. A comparative analysis is made of these impacts on each of four options for pedestrian flow. Results show that either a pedestrian bridge or a signalized crosswalk across the main route appear superior, minimizing pedestrian-vehicle conflicts, separating spectators from dignitaries and officials, and consolidating bus staging activities in a single adequately sized location. Options that assume joint use of the road by vehicles and pedestrians should be avoided because of the crucial requirement for maximum road capacity to handle bus circulation. Further factors to be considered include lighting, liability, environmental constraints, land availability, and budgetary limitations.

by Peter L. Wolf; David T. Hartgen
State Univ. of New York at Albany, Geography Dept.; New York State Dept. of Transportation, Planning and Res. Bureau
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p10-5
1978 ; 6refs
Availability: In HS-026 724

HS-026 730

CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)

Since 1970, a number of Tokyo streets have been opened to pedestrians, sometimes with a ban on vehicle traffic for only a certain period of the day; the procedure is now widespread in Japan. Increasing the number of these streets has caused a decrease in deaths and injuries from traffic accidents. Methods of conversion include the periodic traffic ban on heavily travelled streets, and construction of underground shopping centers and arcade shopping streets. Careful planning of alternative routes is essential. The concept of traffic cells as used in the Federal Republic of Germany is described, and the establishment of a similar arrangement in Nagano City Center is projected. Completion of the Nagano project is planned for 1985.

by Takahiro Murata
National Res. Inst. of Police Science, Traffic Safety Section, Japan
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p16-8
1978 ; 2refs
Availability: In HS-026 724

HS-026 731

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)

An evaluation is made of the state-of-the-art for crossing treatments for the disabled. The study approach used a team leader and a panel of disabled persons who visited crossing facilities representative of current treatments. The results of visits to three overpasses in the San Francisco Bay Area indicated the following major deficiencies. At a pedestrian-motor vehicle overpass there were: no curb cuts at one end, presenting a problem for the wheel-chair bound; no crosswalks or pedestrian warning signs to motorists; obstructed sight lines at areas where high speed on- and off-ramps crossed the pedestrian pathway; no railing to protect pedestrians from long drop-offs on the approaches; greater than acceptable cross slopes on structure sidewalks; no level areas on either side of the freeway motor vehicle on- and off-ramps. At a pedestrian overpass accessible by two solid-core concrete spiral ramps, the following deficiencies were noted: level resting areas are needed; the railing was difficult to grasp; the solid concrete core made it impossible to see or be seen by persons travelling in opposite directions on the spiral; wheelchairs drifted to the outside of the ramp. The third overpass was more acceptable, the only major problem being maze-like barriers at the bottom of each ramp to discourage speeding bicyclists and skateboarders; this caused great difficulty for wheelchair and walker users and for the blind. Plastic screening attached to sections of the fence to protect the privacy of nearby residences reduced noise levels from the freeway below and made it easier for the blind to detect direction and potential conflicts. Since the disabled are a heterogeneous group with varied mobility limitations and needs, it was concluded that a combination of treatments is needed. Motor vehicle-pedestrian overpasses with high-speed ramps are hostile environments where additions of curb cuts may not be adequate. Spiral ramps may be useful but careful design is necessary. Using disabled panelists is a useful technique for evaluating crossing arrangements.

by Sherrill Swan
De Leuw, Cather and Co., San Francisco, Calif.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p18-20
1978 ; 5refs
Based on a Federal Hwy. Administration study.
Availability: In HS-026 724

HS-026 732

MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW

The model pedestrian safety program was the final project in a series of pedestrian studies. The program was designed to consolidate the results of the earlier studies with pedestrian safety data from numerous other sources into a usable format and to develop guidelines for communities interested in initiating or augmenting a pedestrian safety program. An overview of the entire project is presented. A literature review classified 450 documents into a 71-item subject matrix for easy reference. During the review of operational experience, contacts were made with 19 American communities to gather data on the day-to-day operations of ongoing pedestrian safety efforts, and a six-point users' manual was developed. These guidelines detail identification of the extent of the pedestrian safety problem and of alternative countermeasure solutions, selection of the best alternative implementation of the alternative chosen, evaluation of its effectiveness once initiated, and maintenance of the safety program.

by Gerald R. Vallette; Judith A. McDivitt
BioTechnology, Inc., Falls Church, Va.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p21-5
1978 ; 3refs
Sponsored by Federal Hwy. Administration.
Availability: In HS-026 724

HS-026 733

SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]

Findings of bicycle field surveys are presented, including 685 interviews with riders in six Israeli towns having very different levels of bicycle use. Data are analyzed on bicycle accidents and on mode of travel to work and school in 29 towns. Estimates are made of the number of bicycles in use, the number of riders, and annual travel by age and sex of rider for major trip purposes. It is concluded that bicycle travel represents an overall addition of 12% to urban travel at present levels of use in Israel and, on this basis, accident risk per kilometer of bicycle travel is about the same or even lower than that for passenger automobiles. Bicycles are not only an extremely important means of transport for the 10- to 19-year age group, but in towns where bicycle use is high (20% of total trips) all ages of males and females use them actively for shopping, recreation, and work. Trip lengths are rarely above 5 km and vary according to age, sex and trip purpose; trip length characteristics are usually similar to those found in Europe. For towns with flat topography and populations of 100,000 or less, multiple regression analysis indicated that six factors accounted for 59% of the variance in bicycle use in the 24 towns studied: population, radius, density, number of persons per household, percent welfare expenditure, and percent working out of town. In very small and poor towns, walking was found to be an alternative to bicycling; in other towns, industry-provided transportation seemed to be an alternative mode. For towns in developing countries, trying to keep transport costs low, and for protection of environmental quality, at least some parts of the urban structure should be planned to accommodate and encourage bicycle travel.

by Allan Katz
Technion--Israel Inst. of Tech., Road Safety Center, Haifa, Israel
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p25-33
1978 ; 16refs
Availability: In HS-026 724

HS-026 734

CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS

A study was made of cyclist behavior patterns at signalized intersections, to determine which types of bicycle traffic regulators are most likely to reduce bicycle/motor vehicle conflicts. Cyclist behavior was recorded during Feb. 1977 in Tempe, Ariz., at nine intersections, selected for their various bicycle facilities. At three approaches classified according to the type of push-button traffic signal available and the existence of a bike lane, the rate of use of the three types of push buttons--standard, cyclist, and cyclist-pedestrian--are compared. The effect on push button use of the presence of motor vehicles is analyzed by the type of intersection. Cyclist queuing patterns at the intersections, the use of pedestrian crosswalks by cyclists, and cyclist delay caused by vehicles turning right at the intersection were also studied. Cyclist push buttons are used most frequently and induce the majority of cyclists to stop in the most suitable queue area; cyclist-pedestrian and standard push-buttons cause more cyclists to stop in the zone with the greatest potential of accident occurrence. Painted bike lanes have no effect on the rate of use of push buttons or on the safety queue area. Cyclists are willing to use the crosswalk if it is not too far from their route of travel. To achieve maximum use, future installations of push buttons should be cyclist push buttons, and if possible, other types should be replaced with this type. Bicycle traffic at intersections should be channeled by providing cyclists with bicycle crossings or painted queue areas to avoid motor vehicle-bicycle conflicts. Cyclists should be encouraged to follow the pedestrian walking signals, either by stating this as a rule or by posting signs.

by Peter Ju-Cheng Chao; Judson S. Matthias; Mary R. Anderson
Arizona State Univ.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p34-9
1978 ; 8refs
Availability: In HS-026 724

HS-026 735

EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM

The attitudes of cyclists toward a newly established on-street bicycle lane and its effect on their route selection were analyzed by pre- and post-bicycle lane traffic counts. Cyclists rated the street as a much improved bicycle route, and both the mapping interview studies and the traffic counts showed that many cyclists shifted their route selection to take advantage of the bicycle lanes. These ratings and route selection shifts occurred because cyclists believed the lanes made riding safer and more convenient by giving cyclists their own area on the street. Bicycle lane approval and usage were strongly related to the age of the cyclist; those 25 and older perceived the greatest degree of improvement and were most strongly influenced in route selection. College age (18 to 24) cyclists perceived the smallest degree of improvement and were least influenced in route selection by the new lanes. A following discussion by John Forester opposed the thesis that bike lanes are safer, citing evidence that painting the normal bike-lane stripe modifies neither cyclists' nor motorists' behavior, and disputed the definition of "experienced cyclists" and the assessment of the hazards of local roadways. In rebuttal, the original authors questioned the relevance of this criticism. and urged a cycling policy to appeal to a broad section of the population.

by Dale F. Lott; Timothy Tardiff; Donna Y. Lott
University of California, Davis, Calif.; Bicycle Res. Associates, Davis, Calif.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p40-6
1978 ; 17refs
Includes discussion by John Forester (Custom Cycle Fitments) and authors' closure.
Availability: In HS-026 724

HS-026 736

NORTH CAROLINA'S BICYCLING HIGHWAYS

The bicycle program of the North Carolina Dept. of Transportation has initiated a unique project called "bicycling highways" to develop a statewide bicycle route system on existing roads of the state's primary and secondary highway systems. Although no roadway where automobiles and bicycles mix can ever be totally safe, many highways, unknown to the majority of people, are relatively safe for bicycling, due to their low traffic volume and good roadway conditions. By linking these roads throughout the state and providing detailed route information, a safer environment for the growing bicycle population is expected. The methodology is described that was undertaken in the selection of highways, as are survey techniques, information gathering procedures, map drafting, and reproduction of copies of the finished product. The resulting maps and narrative provide a very usable and informative product, requiring only small amounts of money and resources.

by Curtis B. Yates; Mary Paul Meletiou
North Carolina Dept. of Transportation, Bicycle Prog.
Publ: HS-026 724 (TRR-683), "Road User Information Needs, Pedestrian Movement, and Bicycle Travel Patterns,"
Washington, D.C., 1978 p47-53
1978
Availability: In HS-026 724

HS-026 737

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT

The relative safety of two types of truck combination vehicles, single (a tractor unit attached to a semitrailer) and double (tractor-semitrailer-full trailer,), are compared. California was identified as the state having the closest to a 50-50 split between the two truck classifications, and 1974 data represents the most recent year for which both detailed California accident and exposure data existed. The 1974 accident data were combined with estimates of truck exposure to arrive at accident and injury rates based on vehicle miles of travel. Average cargo weights were estimated in order to evaluate the safety of the two vehicle types on the basis of cargo ton-miles of travel. There was no significant difference between the number of accidents or injuries per million vehicle miles (MVM) of travel for the two vehicles. Doubles accidents resulted in a significantly higher number of fatalities per MVM. Based on the cargo hauled, singles had a significantly higher accident frequency and injury rate per million cargo ton-miles of travel, but there was no difference in the number of fatalities.

by Chang S. Yoo; Martin L. Reiss; Hugh W. McGee
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
DOT-FH-11-8835
Rept. No. FHWA-RD-78-94 ; 1978 ; 74p 4refs
Rept. for Oct 1976-Feb 1978.
Availability: NTIS

HS-026 738

TRANSPORTATION AND THE FUTURE

An introductory overview is presented of currently emerging and future technological developments in U.S. transportation. The characteristics of future transportation systems will be determined largely by their missions and by the character of their environment. Demographic shifts place added emphasis on automated systems because of a decreasing labor pool of young and middle-aged Americans, and on systems to serve low-density, suburban, and rural areas. Energy constraints may make electrically-powered systems more attractive. Future urban transportation systems will probably consist of a combination of options, including technologically upgraded versions of existing options, as well as new options, such as personal rapid transit or dual mode. Bus systems to serve rural or exurban areas are also developing, and may be tied into evolving urban systems. The passenger car, or a similar option, will probably retain dominance in the transportation scene. Design changes have already made cars more fuel-efficent, and new engine technologies also appear promising in the longer term (post-1985). Energy shortages may necessitate more reliance on intercity rail systems, with buses serving lower density routes. After the turn of the century, tracked levitated vehicles may supplant high-speed trains on high-density routes. Energy-efficient jet transports and new short-range, short-takeoff aircraft should enter service in the 1980's. Supersonic, hypersonic, and lighter-than-air aircraft may also have long-term applicability. Trucks are growing larger and are consuming less fuel on a relative ton-mile basis. Containerization and automated freight handling should improve their compatibility with rail and air freight systems. Nuclear power freighters and tankers may appear on sea routes, with inland vessels or barges carried as intermodal containers. New pipeline technologies are also emerging. The space shuttle will enter service in the early 1980's.

by Paulhus, Norman G., Jr.
Department of Transportation, Office of the Secretary, Washington, D.C. 20590
1979 ; 70p 77refs
Availability: Corporate author

HS-026 739

CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT

A two-year study is described which resulted in the development of a comprehensive traffic safety education plan. This plan will be used as a guide by the California Dept. of Education to establish a statewide traffic safety education program. The study involved gathering, reviewing, and evaluating data and materials on all elements of traffic safety education. The plan identifies critical and priority problems and provides recommendations for their solutions as well as for immediate and long-range program implementations, program phases, time frames, and estimated costs. Subject areas addressed include alcohol and drug safety education, bicycle safety education, driver education, driver improvement, manpower development, motorcycle safety education, passenger safety education and pedestrian education.

California State Dept. of Education, California Traffic Safety Education Task Force, 721 Capitol Mall, Sacramento, Calif. 95814
Rept. No. 75-106-DE9210-1-77-300 ; 1977 ; 330p refs
Sponsored in part by California Office of Traffic Safety, and National Hwy. Traffic Safety Adminstration.
Availability: Corporate author

HS-026 740

BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN

The Electra-Van, Model 500-108, an electric, quarter-ton, multipurpose van, was tested at the Army Proving Ground Test Facilities in Aberdeen, Md., as part of a Dept. of Energy project to characterize the state of the art of electric vehicles. The Electra-Van, manufactured by Jet Industries, Inc. (Austin, Tex.), is a converted Subaru minivan powered by 18 6-volt batteries connected to the motor through a semiconductor controlled rectifier controller. The controller is actuated by a foot pedal to control motor speed. The 14.2 hp motor drives the rear wheel through a four-speed manual transmission. No regenerative braking is provided. The Electra-Van underwent range tests at constant speed and under driving schedules, and acceleration and coastdown tests. The vehicle, instrumentation, and test procedures are described. Test results are presented and discussed concerning maximum speed, maximum acceleration, gradeability, road-energy consumption, road-power requirements, and indicated energy consumption. Battery performance data are provided, as well as braking test results and driver reaction. Appended are a vehicle summary data sheet, a description of the vehicle test track, and vehicle preparation and test procedure descriptions.

by Edward J. Dowgiallo, Jr.; Cornelius E. Bailey, Jr.; Ivan R. Snellings; William H. Blake
Army Mobility Equipment Res. and Devel. Command, Electric Power Lab., Fort Belvoir, Va. 22060
EC-77-A-31-1042
Rept. No. AD-A065 147; MERADCOM-2260 ; 1978 ; 71p 2refs
Sponsored in part by the Dept. of Energy.
Availability: NTIS

HS-026 741

ANTHROPOMETRIC SOURCE BOOK. VOL. 1: ANTHROPOMETRY FOR DESIGNERS

A large mass of anthropometric data are assembled which define the physical size, mass distribution properties, and dynamic capabilities of U.S. and selected foreign adult poplations. Aimed specifically to meet the needs of design engineers engaged in the design and execution of clothing, equipment, and workspaces for the NASA Space Shuttle Program, the book is also designed to be of use to human engineers in a wide variety of fields. It is not only a comprehensive source of specific anthropometric information but also a guide to the effective applications of such data. Subjects covered include physical changes in the zero-g environment, variability in body size, mass distribution properties of the human body, arm and leg reach, joint motion, strength, sizing and design of clothing and workspaces, and statistical guidelines. Material presented includes such unpublished anthropometric data measured under one-g and zero-g conditions. Also included are 1985 body size projections and design of cutouts of quarter-scale two-dimensional manikins for use by designers.

Webb Associates, Anthropology Res. Proj., Yellow Springs, Ohio 45387
Rept. No. NASA-RP-1024-Vol-1; S-479-Vol-1 ; 1978 ; 605p refs
Sponsored by National Aeronautics and Space Administration.
Vol. 2, A Handbook of Anthropometric Data, is HS-026 742;
Vol. 3; Annotated Bibliography of Anthropometry, is HS-026 743.
Availability: NTIS $16.50

HS-026 742

ANTHROPOMETRIC SOURCE BOOK. VOL. 2: A HANDBOOK OF ANTHROPOMETRIC DATA

A large mass of anthropometric data is assembled which define the physical size, mass distribution properties, and dynamic capabilities of U.S. and selected foreign adult populations. Aimed specifically to meet the needs of design engineers engaged in the design and execution of clothing, equipment, and workspaces for the NASA Space Shuttle Program, the book is also designed to be of use to human engineers in a wide variety of fields. It is not only a comprehensive source of specific anthropometric information but also a guide to the effective applications of such data. Data resulting from surveys of 61 military and civilian populations of both sexes from the U.S., Europe, and Asia are presented. Some 295 measured variables are defined and illustrated.

Webb Associates, Anthropology Res. Proj., Yellow Springs, Ohio 45387
Rept. No. NASA-RP-1024-Vol-2; S-479-Vol-2 , 1978 ; 429p 91refs
Sponsored by National Aeronautics and Space Administration. Vol. 1, Anthropometry for Designers, is HS-026 741; Vol. 3, Annotated Bibliography of Anthropometry, is HS-026 743.
Availability: NTIS $14.00

HS-026 743

ANTHROPOMETRIC SOURCE BOOK. VOL. 3: ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY

A large mass of anthropometric data is assembled which define the physical size, mass distribution properties, and dynamic capabilities of U.S. and selected foreign adult populations. Aimed specifically to meet the needs of design engineers engaged in the design and execution of clothing, equipment, and workspaces for the NASA Space Shuttle Program, the book is also designed to be of use to human engineers in a wide variety of fields. It is not only a comprehensive source of specific anthropometric information but also a guide to the effective applications of such data. This annotated bibliography covers a broad spectrum of topics relevant to applied physical anthropology with emphasis on anthropometry and its applications in sizing and design. References are included to every anthropometric survey outlined in Vol. 2; to a variety of other works on static and working anthropometry of U.S. and foreign populations, anthropometry of parts of the body, and joint range and arm reach material; studies and reports covering the mass distribution properties of the body and strength data; articles on sizing systems, materials on zero-gravity, and some general reference works. Four additional annotated bibliographies are included. Entries are listed alphabetically by senior author and numbered for index reference. An author index and a key word index are supplied.

Webb Associates, Anthropology Res. Proj., Yellow Springs, Ohio 45387
Rept. No. NASA-RP-1024-Vol-3; S 479-Vol-3 ; 1978 ; 131p 241refs
Sponsored by National Aeronautics and Space Administration. Vol. 1, Anthropometry for Designers, is HS-026 741; Vol. 2, A Handbook of Anthropometric Data, is HS-026 742.
Availability: NTIS $7.00

HS-026 744

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY

Controversy over passive restraint devices in automobiles was examined in a survey of Road and Track magazine readers. A total of 38,449 questionnaires provided data on frequency of safety belt use, preferred type of safety device (conventional lap/shoulder restraints, passive safety belts as in the Volkswagen Rabbit, or air bags), whether air bags should be optional for persons who want them, and whether Congress should repeal air bag legislation. Cars from 1970-1979 model years were evaluated. The estimate that 71% wore belts all the time was about 3.5 times higher than the figure from National Hwy. Traffic Safety Administration studies and about double that in a study of stopped cars involved in accidents. Reasons for wearing safety belts only part of the time or never included the usual excuses: individuals did not feel the need to wear belts below a speed of 40 mph, did not take the time to fasten belts, and only drove short distances. Several readers complained about shoulder belts applying too much pressure on their breasts or straps chafing their necks. Others commented that belts were inconvenient to put on and were restrictive and that automatic locking devices tightened belts when cars were driven on rough roads. Most respondents for all model year cars preferred conventional safety belts, indicated air bags should be optional for persons who want them, and stated that Congress should repeal air bag legislation. Sample responses are included.

by John Dinkel
Publ: Road and Track v31 n1 p47-50, 52 (Sep 1979)
1979
Availability: See publication

HS-026 745

ROADSIDE SAFETY APPURTENANCES

This compilation of 12 papers focuses on highway safety devices. Specific topics of interest are a cost-effectiveness model for guard rail selection, computerized inventory and priority analysis for roadside obstacles, test vehicle kinematics by high-speed photography and accelerometer data, experimental evaluation of a portable energy-absorbing system for highway service vehicles, crash test performance of a guard rail median barrier and temporary construction zone crash cushion, properties of guard rail posts for various soil types, development and testing of a breakaway support coupling for light poles, dynamic testing of malleable aluminum transformer bases for highway luminaires, pendulum tests of breakaway wood sign supports using crushable bumpers, breakaway sign testing, and evaluation of bolted-base steel channel sign posts.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-679 ; 1978 ; 52p 43refs
Includes HS-026 746--HS-026 757. Papers prepared for the 57th annual meeting of the Transportation Res. Board.
Availability: TRB $3.00

HS-026 746

PERFORMANCE OF HIGHWAY SAFETY DEVICES

Accident records were compiled over a 5-year period (1971-1975) to evaluate the performance of roadside barriers, impact attenuators, slip base sign supports, and frangible base luminaire supports on highways in New York State. Data were collected on guide rails and median barriers, sign and luminaire supports, and impact attenuators (sand-filled plastic barrels, empty steel drums, and water-filled vinyl tubes). Design and construction variables incorporated in the analysis were barrier or impact attenuator type, impact location on barrier, impact conditions, vehicle size, and barrier mounting height. Parameters used to evaluate the performance of safety appurtenances included injury severity, vehicle reaction, and maintenance requirements. In total, 392 impacts on guide rails and median barriers were recorded during the study period, with 90% occurring during 1972 and 1973. All attenuators performed well in preventing serious injuries to occupants of impacting vehicles. Barrier penetration occurred in only 4% of mid-section accidents. Based on 10 accidents, slip base sign supports appeared to perform satisfactorily. Based on 78 accidents, the performance of aluminum frangible-base luminaire supports was excellent. Most serious accidents related to specific problems with individual attenuators or with secondary collisions. Although large differences in maintenance costs were apparent among highway safety devices, total cost depended on device installation cost and on the number of impacts a device could withstand before replacement was required.

by Robert D. Carlson; Joseph R. Allison; James E. Bryden
New York State Dept. of Transportation
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p1-8
1978 ; 6refs
Prepared for the 57th annual meeting of the Transportation Res. Board.
Availability: In HS-026 745

HS-026 747

COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)

This program was designed to develop a cost-effectiveness model for guardrail selection that would include cost parameters for various guardrail configurations and criteria for the analysis of system effectiveness under dynamic impact conditions. Eleven guardrail types were chosen for inclusion in the program. Impact category values concerned vehicle size, vehicle speed, and angle of impact. A present worth probabilistic formulation was employed in developing the cost/effectiveness model, combining guardrail installation cost and annual maintenance and accident costs into a single equivalent sum at zero time. Of alternatives compared, the one with the lowest present worth was the most economical. To apply the model formulation in developing a computer algorithm, it was necessary to estimate traffic mix, number of encroachments, probability of out-of-control vehicles traversing offset distance to the guardrail or obstacle, distribution of vehicle speeds, impact angles, accident severity, travel delay time for accident blockage and guardrail repair, costs associated with injury and property damage (vehicles and guardrail), and service life of guardrail and rate of interest. Cost-effectiveness values encompassed government costs, societal costs, total costs (government and societal costs), benefits, and a benefit-to-cost ratio. A COCOST program for comparative cost-effectiveness values and ranking of guardrail types, with given roadway conditions, was developed. The COCOST users manual covers basic operations and limitations of the program and includes computer program descriptions and listings, site selection tables based on representative costs and input values, and sample problems for applying the computer program. A sample COCOST output sheet is illustrated.

by L. R. Calcote
Southwest Res. Inst., San Antonio, Tex.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p8-10
1978 ; 2refs
Prepared for the 57th annual meeting of the Transportation Res. Board. Research sponsored by Federal Hwy. Administration.
Availability: In HS-026 745

HS-026 748

COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)

A computerized inventory and priority ranking scheme for roadside obstacles is described. Highway safety is significantly influenced by design and maintenance of the roadside environment. In 1976, over 26% of all fatal accidents in Michigan involved collisions with fixed objects in or adjacent to the roadway. To provide material for a computerized information system based on an inventory of all roadside obstacles in the city of Livonia, Mich., data on roadside obstacles were gathered using 35-mm color photologs and the following factors extracted: object type, lateral distance of object from edge of the roadway, physical dimensions of object, and existence of curbs along the roadway. Obstacle type and rigidity were reflected in a severity ranking index assigned to 12 categories of roadside obstacles. It was determined that roadside obstacles presenting the greatest hazard potential (trees, utility poles, mast arm supports, buildings, and guard rails) constitute 48% of all roadside obstacles recorded in the inventory. The inventory system incorporates a prioritization mechanism that provides traffic engineers with a measure of the relative hazard potential of each obstacle type and with information on the priority to be given to eliminating or protecting that obstacle. Planned improvement of high-severity potential obstacles may be a cost-effective way to reduce accidents and/or accident severity.

by Richard A. Cunard; David D. Perkins; Tapan K. Datta
Traffic Improvement Assoc. of Oakland Country, Mich.; Goodell-Grivas, Inc., Southfield, Mich.; Wayne State Univ.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p10-2
1978 ; 2refs
Prepared for the 57th annual meeting of the Transportation Res. Board. Sponsored by Federal Hwy. Administration.
Availability: In HS-026 745

HS-026 749

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)

Experimental test data show how data acquisition techniques of high-speed photography and accelerometer readings compare with theoretical values in the evaluation of vehicle kinematics relative to guardrail and median barrier systems. Although it was assumed that differentiation of photographic data would be less accurate than integration of accelerometer data for desired kinematic quantities, it was found that cine data yield as accurate and probably more accurate results than accelerometer data. Considerably more instrumentation is necessary for the retrieval of accelerometer data; initial conditions must be known in the integration process, and instantaneous direction must be determined if motion is curvilinear. High-speed cine retrieval has the advantages of greater simplicity and the self-starting characteristic, but care must be exercised in data differentiation.

Errors caused by differentiation of curve fits near ends of sampled data can be made less significant if the period of interest is bracketed on both ends by data sampling.

by L. R. Calcote; R. E. Kirksey
Southwest Res. Inst., San Antonio, Tex.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p13-5
1978
Prepared for the 57th annual meeting of the Transportation Res. Board. Previously published in Experimental Mechanics (May 1977) under title of "A Comparison of High-Speed Photography and Accelerometer Data-Reduction Techniques."
Availability: In HS-026 745

HS-026 750

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)

A portable energy-absorbing system attached to the rear of a highway service vehicle was subjected to crash testing in a study to design a system for protecting the motoring public and service personnel engaged in highway maintenance operations. The system was developed to absorb most energy dissipated in high-speed collisions between automobiles and highway service vehicles in such a way that acceleration and acceleration rates of vehicles are within guidelines specified by the Federal Hwy. Administration. System components include a service vehicle guidance frame, energy-absorbing pipes, and an impacting plate assembly. Four full-scale crash tests were conducted to evaluate system performance with respect to structural adequacy, impact severity, and vehicle trajectory. Testing with four vehicles (Ford Maverick, Pontiac, and two Plymouths) demonstrated effective system performance in the areas of energy dissipation, cost, eccentric impact, damage, and design.

by John F. Carney, 3rd.
University of Connecticut, Storrs, Conn.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p16-8
1978 ; 2refs
Prepard for the 57th annual meeting of the Transportation Res. Board. Sponsored by Connecticut Dept. of Transportation and Federal Hwy. Administration.
Availability: In HS-026 745

HS-026 751

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)

The Guard Rail Energy Absorbing Terminal (G-R-E-A-T) and the G-R-E-A-T Construction Zone, restorable attenuator systems developed to cushion narrow stationary and construction zone hazards, are examined. The G-R-E-A-T crash cushion consists of crushable Hi-Dri cartridges surrounded by steel thrie-beam guard rail. When hit head on, thrie-beam fender panels telescope backward and permit impact energy to be dissipated in crushing lightweight concrete Hi-Dri cells. When impacted on the side, side panels redirect the errant vehicle away at a shallow exit angle. Hi-Dri cartridges contain many cylindrical cells made of lightweight concrete which are bonded to plywood retainer panels and encased in a moisture-resistant box. Deflector panels are attached to the back of each fender panel when the G-R-E-A-T is used in median barrier applications where traffic is going the wrong way on the left side of the unit. Tests were conducted with drivers of four vehicles (heavy car centered on unit nose, light car centered on unit nose, heavy car with 20-degree side angle impact at midlength, and heavy car offset from unit nose at 10-15 degree impact angle) and for wrong way side angle impacts. Persons driving at speeds up to about 50 mph reported no discomfort from restraining belts in both head-on and side angle impacts. Test results proved that the G-R-E-A-T system satisfies requirements established for serviceable impact attenuators.

by Bruce O. Young; Robert M. Davis
Energy Absorption System, Inc., West Sacramento, Calif;
Aerojet Services Co., Sacramento, Calif.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p19-21
1978 ; 4refs
Prepard for the 57th annual meeting of the Transportation Res. Board.
Availability: In HS-026 745

HS-026 752

PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES

Pendulum tests were carried out on two typical guard rail posts installed in five different soil types to determine post property variations as a function of soil conditions. Instrumentation consisted of a voice track, impact switch, speed trap, and two accelerometer channels recorded on magnetic tape. High-speed photography was attempted as a backup program for data reduction. Test results were used for post input properties in the BARRIER VII computer program to estimate the ultimate effect of soil conditions on guard rail performance. Satisfactory full-scale vehicle guard rail or median barrier tests on installations of less than 45.7 meters (150 feet) were usually achieved with exceptionally good post and soil conditions. Computer simulations with post properties indicated that barrier failure problems can be expected for severe impacts on short installations with poorer soil types. It is recommended that guard rail lengths be at least 45.7 meters unless precautions, such as concrete footings or greater post embedment depth, are taken to assure post integrity, particularly if available space behind the barrier is limited. For vehicle containment and redirection with barrier lengths of 45.7 meters or greater, end posts should be sufficiently anchored to develop full post strength in the lateral direction, along with the usual longitudinal anchorages.

by L. R. Calcote; C. E. Kimball
Soutwest Res. Inst., San Antonio, Tex.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p22-5
1978 ; 8refs
Prepared for the 57th annual meeting of the Transportation Res. Board. Sponsored by Federal Hwy. Administration.
Availability: In HS-026 745

HS-026 753

DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)

Technology involved in a longitudinally-grooved breakaway support coupling system for use on light poles is discussed, and results of fatigue, vehicle crash, and pendulum impact testing are presented. The Pole-Safe breakaway support coupling is a frangible coupling designed to ensure that light poles will break away under impact. The coupling, made from die-cast aluminum, provides a breakaway spacer between a light pole and its foundation. By using this type of coupling, problems in tension and bending loads are eliminated; longitudinal notches provide high stress concentration for rapid fracture at relatively low impact levels; the ratio of service load capacity to failure load is high; and there is good control of fracture mode to insure repeat impact performance for any design impact load. Test results indicate that Pole-Safe couplings meet criteria established by the American Assoc. of State Hwy. and Transportation Officials and the Federal government for breakaway light pole support systems. Since light poles and mast arms were not damaged in vehicle and pendulum crash tests, it appears that most poles installed with these couplings will be reusable after impact. Anchor bolts in vehicle and pendulum crash tests were neither bent nor damaged when used with the couplings, and it is expected that highway use experience will be similar.

by Arthur M. Dinitz; Douglas B. Chisholm
Transpo-Safety, Inc., New Rochelle, N.Y.; Federal Hwy. Administration
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p26-8
1978
Prepared for the 57th annual meeting of the Transportation Res. Board.
Availability: In HS-026 745

HS-026 754

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES

A test program was undertaken to modify malleable aluminum transformer bases for highway luminaires with minimal equipment and labor expenditures. The program was evaluated by determining whether modifications resulted in acceptable breakaway performance as indicated by the momentum change of the impacting vehicle; and by determining whether modifications resulted in serious degradation of expected service life as indicated by a limited accelerated fatigue study. Performance appraisal of transformer bases was based on structural adequacy, impact severity, and vehicle trajectory hazard factors. Dynamic tests employed a 1,020-kg (2,250-lb) car impacting at 9 and 18 meters per second (20 and 40 mph). Fatigue tests consisted of vibrating a horizontally-mounted base and pole shaft at the resonant frequency of the pole until failure occurred. Tests indicated that a base saw cut, made horizontally to leave 76.2 by 4.76 mm thick metal on each side, would induce approximately 362 kg/second (800 lbs/second) momentum transfer and 6 g 50 millisecond maximum average deceleration in the test vehicle. Terminating the saw cut in 38-mm-diameter holes proved sufficient to induce fatigue failure in the unmodified pole instead of the base. Pole Kinematics after impact could not be determined in this program, but vehicle trajectory hazard is thought to be negligible.

by John E. Haviland; David J. Segal
New York State Dept. of Transportation; Calspan Corp., Buffalo, N.Y.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p29-33
1978
Prepared for the 57th annual meeting of the Transportation Res. Board. Sponsored jointly by the New York State Dept. of Transportation and the Federal Hwy. Administration.
Availability: In HS-026 745

HS-026 755

PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS

Ten pendulum impact tests of breakaway wood sign supports were conducted to evaluate safety performance. Timber test specimens and signing hardware were supplied by the Michigan Dept. of State Highways and Transportation. Timber support specimens (yellow pine with pentachlorophenol preservative) were inserted into an 18-inch-round concrete footing that had been constructed with a sheet metal sleeve. Wood shims were used to insure that each specimen tightly fitted into the sleeve. Soil constituted a relatively stiff support for the concrete footing. A 1,020-kg (2,250-lb) reinforced concrete mass with a swing radius of 7.9 meters (26 feet) impacted each specimen 0.5 meter (20 inches) above grade. The front of the mass was fitted with a crushable aluminum honeycomb nose to simulate vehicle crush or deformation. In addition to the 1,020-kg impact condition, a speed of 32 km/hr (20 mph) was tested. Findings demonstrated that breakaway wood sign supports can be modified by drilled holes to effect structures which safely break away with a pendulum mass momentum change of less than 750 lbs/second. The crushable nose design has an important effect on breakaway performance, providing variations in momentum change and fracture energy related to nose design. Sequential photographs illustrate that the fracture mechanism of modified timber supports is similar across all tests.

by C. E. Kimball; J. D. Michie
Soutwest Res. Inst., San Antonio, Tex.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p33-8
1978 ; 9refs
Prepared for the 57th annual meeting of the Transportation Res. Board.
Availability: In HS-026 745

HS-026 756

BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)

Testing was conducted on New Jersey's breakaway system for large ground-mounted sign supports, to evaluate the reaction of existing structures to impact and to identify areas for further improvement. The New Jersey breakaway system consists of three basic parts other than the sign panel and posts. The base of each post is connected to anchor bolts with metal couplings and washers that break under vehicle impact but resist wind loads applied to the sign panel. The sign panel sits over a pin on the top of the post, with the lower edge of the panel held to the post by a clamp. On impact, the lower clamp breaks, permitting the post and attached pin to drop free of the panel and to rotate upward away from the panel, although still attached to the panel by a wire rope and aluminum tube (shock absorber) that extrudes and reduces force applied to the panel during restraint of the free post. A system using a heavy truck and a steel cable was devised for testing, although differences in test conditions such as lack of vehicle crush and the resulting longer impact duration precluded measuring momentum change in a definable manner. To record data in the investigation of field impacts, photographs were taken by normal-speed still and high-speed movie cameras. Consistent problems with release of the post from the signal sign panel and with the shock absorbing system were observed. A breakaway sign structure with a 6x12-foot extruded sign panel was identified as the critical size for tests, and modifications were made. The modifications are detailed. It is recommended that full-scale crash testing be conducted in accordance with Recommended Procedures for Vehicular

Crash Testing of highway Appurtenances and that the modified breakaway sign structure be installed in locations where it will be subjected to high winds.

by J. C. Powers; W. M. Szalaj; R. L. Hollinger
New Jersey Dept. of Transportation, Div. of Res. and Devel.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p38-41
1978 ; 5refs
Prepared for the 57th annual meeting of the Transportation Res. Board. Prepared in cooperation with Federal Hwy. Administration.
Availability: In HS-026 745

HS-026 757

EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST

The Eze-Erect system was developed by the Franklin Steel Co. to simplify the installation of U-posts. A stub post about three feet in length is initially driven into the ground. The sign post with sign panel for single-post installation is attached to the stub post with the Eze-Erect bolted connection. A retainer-spacer strap is used in the connection, primarily to provide a close fit at the post-to-stub connection during normal loading conditions. Results of static load tests and full-scale vehicle crash tests showed that the bolted stub-sign post connection provides a simple but effective device for installing a steel U-post sign support system. Use of this connection reduces the hazard associated with driving full-length posts. Special equipment such as a lift truck or other devices to obtain required heights for driving is not required since the stub can be driven from ground level. Another desirable system feature is that the sign panel can be mounted to the sign post prior to post erection. Static test load tests show that the Eze-Erect assembly does not compromise the elastic strength of an installation. Full-scale vehicle crash tests indicate that vehicle damage is minor.

by Hayes E. Ross, Jr.; Michael J. Effenberger; Lawrence J. Sweeney
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.; Franklin Steel Co., Franklin,, Pa.
Publ: HS-026 745 (TRR-679), "Roadside Safety Appurtenances," Washington, D.C., 1978 p41-6
1978 ; 5refs
Prepared for the 57th annual meeting of the Transportation Res. Board.
Availability: In HS-026 745

HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT

A multivariate model of auto ownership and mode choice is described, with its use in forecasting 1990 travel behavior, for a sample of 346,000 households and 407,000 workers in the largest 125 metropolitan areas. Household auto ownership decisions depend on family type and composition, household income, residential and workplace location, highway and transit service levels, and measures of overall urban spatial structure for each area. Given the number of cars owned and the variables used to explain auto ownership, each worker in the household selects one of five worktrip modes. This research advances the field of travel demand forecasting by considering auto ownership and mode choice behavior in a large number of metropolitan areas; by quantifying how metropolitan land use patterns affect auto ownership and use; by documenting the influence of racial discrimination on black household behavior; and by analyzing walk to work trips. The 1990 projections indicate that increases in household income will have the most significant impact on urban travel behavior, with changes in household composition and size and land use patterns having smaller effects.

by John F. Kain; Gary R. Fauth; Jeffrey Zax
Harvard Univ., Dept. of City and Regional Planning, Combridge, Mass. 02138
DOT-OS-30099
Rept. No. DOT/RSPA/DPB-50/78-21; PB-292 873 ; 1978 ; 186p 28refs
Rept. for 1 Jul 1976-1 Dec 1977. Vol. 2, Model Equations, is HS-026 759.
Availability: NTIS

HS-026 759

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT

The auto ownership and mode choice models described in Vol. 1 of this report predict the probabilities that a household will own zero, one, or two or more cars, and that employed household members will commute to work as auto drivers, auto passengers, bus passengers, rail passengers, or by walking. This volume presents the coefficients of the multivariate equations that were estimated from samples of 346,893 households and 407,731 employed household members in the 125 largest U.S. metropolitan areas. Together, the equations provide a recursive characterization of household auto ownership and mode choice decisions.

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DOT-OS-30099
Rept. No. DOT/RSPA/DPB/50-78/22; PB-291 373 ; 1978 ; 194p
Rept. for 1 Jul 1976-1 Jan 1978. Vol. 1 is HS-026 758.
Availability: NTIS

HS-026 760

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS

Regresssion analyses were used to estimate the strength of the relationship between driver education enrollment, laws requiring driver education for licensing before age 18, and the rate of licensing of 16 and 17 year olds. A cross-sectional longitudinal data set was developed which included all data reported for several variables by any of the states and D.C. from 1965 through 1975. Results showed that driver education is significantly and positively related to the licensing rate of 16 and 17 years olds; that this relationship was much weaker than that reported in previous research; that the relationship was not greatly diminished when economic and mobility factors were controlled; and that the relationship was considerably stronger between 1971 and 1975 than between 1965 and 1970. The presence of driver education laws had a significant negative relationship with the licensing of young drivers but a significant positive relationship with driver education enrollment. These results suggest that driver education probably accounts for some increase in the licensing of young drivers. Research has indicated that the safety benefits of driver education are much smaller than generally claimed. Uncertainty about the magnitude of the effect of driver education on licensure and its safety effect in reducing crash involvement per licensed driver prevent an estimate of its net effect on total crash involvement.

by W. Burleigh Seaver; James L. Nichols; William L. Carlson; Robert B. Voas
National Hwy. Traffic Safety Administration, Washington, D.C.; St. Olaf College, Northfield, Minn.
Publ: Journal of Safety Research v11 n2 p50-60 (Summer 1979)
1979 ; 19refs
Based in part on NHTSA Technical Note, "An Analysis of the Impact of Driver Education on the Licensing of 16 and 17 Year Olds."
Availability: See publication

HS-026 761

FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS

A critical review of the literature on rubber-metal bonding, including adhesion to brass, primarily cover the 1970-1978 period. Extensive use of brass coatings on steel cords in steel-belted radial tires during the 1960's and 1970's has led to renewed interest in properties of rubber-brass bonding. Emphasis in the literature review is placed on rubber adhesion to brass, bond durability and degradation, the effect of compound parameters on bond strength and durability, and rubber adhesion to zinc. The rubber-brass bond is interpreted as an adhesion of sulfur cross-links to a sulfidized brass surface. These cross-links are bonded to the surface not by fully developed chemical bonds but by covalent bonds comparable to those formed by copper oxide and copper sulfide and various other organic-complexing molecules containing electron-donating nitrogen or sulfur atoms. Adhesion between rubber and brass exceeds the rubber tear strength, since there is intimate contact between rubber and sulfide film that actually grows into the polymer, resulting in a significantly enlarged contact area. There is evidence that only certain types of cross-links, probably those of the polysulfides, cause high bond strength. Brass is inherently sensitive to dezincification and other forms of corrosion. The performance of standard brass coatings in use can be optimized by lowering the plating weight or the bulk copper content, but not both. Improved corrosion resistance can be imparted to the tire cord through the lubricant system by adding substances that specifically suppress dezincification of brass by moisture. Characteristics of rubber-zinc adhesion resemble those of brass in several respects. It is suggested that zinc sulfidization should be stimulated to improve bond strength and that compounds for zinc adhesion should contain certain activators in order to level out variations in zinc surface structures that might cause partial or complete passivation of the surface.

by W. J. Van Ooij
Publ: Rubber Chemistry and Technology v52 n3 p605-75 (Jul-Aug 1979)
1979 ; 156refs
Availability: See publication

HS-026 762

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS

Rear differentials for high-performance engines are considered, particularly the 9-inch Ford type which eliminates deflection as the pinion is forced from the ring gear under load. A major advantage of the Ford engine is its Hotchkiss-type construction. The center section is completely removable, allowing maintenance and gear changes to be done on a workbench instead of under the car. A unique feature of the Ford design is its rear pinion support bearing. Other rearends support the pinion gear only on the shank, but the Ford gear's bearing surface behind the pinion permits the gear to be supported from both sides. Numerous gear ratios are available. Theoretically, the Ford rearend has the greatest percentage of horsepower loss among performance rearends, but few find this excess drag to be a disadvantage. Various housings and center sections are available, and setting up any type of rearend is relatively easy. Tips are provided for identifying a nodular iron case, which is the most satisfactory. Use of the 9-inch rearend in car racing is discussed.

by John Baechtel
Publ: Car Craft v27 n9 p90-3, 109-10 (Sep 1979)
1979
Availability: See publication

HS-026 763

LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES

Experiments by the General Electric Corporate Res. and Devel. Center demonstrated effective satellite-aided land mobile communications, analog and digital data relay, and automatic real-time vehicle position fixing. A station wagon was equipped with a specially designed antenna, a slightly modified commercial VHF transceiver, and a digital tone-code ranging responder that operated within the communications bandwidth. The G.E. Radio-Optical Observatory near Schenectady, N.Y., was the major earth terminal. A commercial VHF base station with a satellite antenna represented a headquaters or sector office ground station. Communications were relayed by NASA's ATS-3 geosynchronous satellite. Both ATS-1 and ATS-3 were used for position fixing the vehicle. Voice, slow scan television, audio test tones, prerecorded intrusion sensor data, and telephone patches were relayed by the satellite to and from the vehicle under a variety of conditions, demonstrating continent-wide communication of a quality comparable to fringe area reception of present local VHF mobile communications but with a notable lack of multipath flutter. Due to the high angle of signalling path, solid structures degraded communications only occasionally. Noisy radio environments degraded received signals but not transmission. Accuracy to within several hundred feet was achieved after post experiment recalibration and analysis. After similar equipment plus biomedical sensors and a medical telemetry unit were installed in an ambulance, NASA's ATS-3 satellite relayed two-way voice communications between a hospital and the ambulance and electrocardiograms from the ambulance to the hospital. Signals were received with excellent quality well beyond the range of conventional line-of-sight communications. The future of operational systems depends on the need to define user requirements, international frequency allocations, and a commitment to support the initial hardware investment. A multibeam spaceborne antenna with low sidelobes will have to be developed. A large space structure may be too expensive as a business venture, but the cost of a satellite system to serve large, thinly populated areas may possibly be less than a network of terrestrial repeaters serving the same area.

by Axel F. Brisken; Roy E. Anderson; Richard L. Frey; James R. Lewis
DEA-76-20
Publ: IEEE Transactions on Vehicular Technology, v VT-28 n3 p153-70 (Aug 1979)
1979 ; 11refs
Portions of this paper were presented at the Carnahan Conference on Crime Countermeasures, Lexington, Ky., 6-8 Apr 1977.
Availability: See publication

HS-026 764

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH

Characteristics of Texaco's controlled combustion engine (CCE) and Oppenheim's plasma jet injection are examined. The CCE is not critical with respect to octane or cetane rating and has the nonthrottle advantages of a diesel. Only air is brought in on the intake stroke, and induction path and intake valve are carefully shaped to swirl air in a rotary pattern above the piston. An injector, much like a diesel injector, is positioned upstream in air swirl from the spark plug and fuel is injected as the spark occurs. As injection proceeds, fuel is swept into a localized ignition and combustion area near the plug. There is a static rather than a moving flame front and products downstream from the burning area are burned gases which cannot detonate like unburned gases in conventional gasoline engines. Professor A. K. Oppenheim, investigating alternatives to the conventional spark plug, has installed a plasma jet ignition plug. A high-voltage discharge back in the hollow nose of the plug creates radicals (ions). This ion plasma, comprised of hot excited particles, blasts from the nozzle as a high-speed plume. Since the plume is not a flame, it does not ignite like a blast from a torch. It penetrates the fuel-air mixture and sets off ignition at many random spots throughout the combustion chamber. Detonation is eliminated with multiple ignition points instead of a sharply defined flame front, making it possible to burn low-octane fuel. Although the approaches of Texaco and Oppenheim are radically different, both accomplish the same results: full breathing without a throttle; power control by metering only fuel; positive ignition without relying on fuel mix or auto ignition properties; and elimination of a detonation-engendering flame front. Both techniques are designed to achieve fuel economy. Separate sections illustrate octane and cetane measurements of gasoline and diesel ignition characteristics, and explain why diesel engines are not a long range solution to the petroleum shortage.

by E. F. Lindsley
Publ: Popular Science v215 n3 p74-7, 154 (Sep 1979)
1979
Availability: See publication

HS-026 765

SURFACE TRANSPORT REGULATION AND RAILROAD PLANNING

This compilation of papers focuses on railroad planning and surface freight regulation. Topics on railroad planning include procedures for developing State rail plans, the branch line policy established by the Railroad Revitalization and Regulatory Reform Act of 1976, railroad operating costs, and strategic planning studies within the British rail system. Subjects in the category of surface freight regulation concern freight transportation and the regulation of intermodal competition; vehicle size and weight regulations, permit operation, and future trends; the performance of public agencies in safety and environmental regulation; internal cross-subsidizations in the general freight sector of the motor carrier industry; and proposals to relax motor carrier regulatory entry controls.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-687 ; 1978 ; 64p 94refs
Includes HS-026 766. Paper prepared for the 57th annual meeting of the Transportation Res. Board.
Availability: TRB $3.40

HS-026 766

VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS

Limits on truck size and weight, practices in permit issuance, and trends in vehicle size and weight are reviewed. Commercial vehicle size and weight limits are fixed, controlled by Federal, state, and local regulations, including provisions of the Federal-Aid Highway Act of 1974. However, oversized-overweight vehicle permits are available by special application in all states, usually through state transportation agencies. Legal weight limits range from from 18,000 to 24,000 lbs for a single axle and from 32,000 to 44,000 lbs for a tandem axle. For gross vehicle weight calculation, most states rely on the bridge formula or on a table of weights using a combination of factors included in the bridge formula calculation. In approximately 87% of the states, maximum height is 13.5 feet; maximum width in 80% of the states is 96 inches. It is estimated that at least 3 million oversize-overweight permits were issued in 1975. A major problem in regulating commercial vehicle size and weight is lack of uniformity among states. Because increased vehicle size and weight yield efficiency in the form of reduced operating costs and decreased fuel consumption per unit of payload, the trend toward increased vehicle size and weight is expected to continue. The impact of larger vehicles must be evaluated in relation to safety considerations.

by Robert D. Layton; William G. Whitcomb
Oregon State Univ., Civil Engineering Dept., Corvallis, Oreg.
Publ: HS-026 765 (TRR-687), "Surface Transport Regulation and Railroad Planning," Washington, D.C., 1978 p39-45
1978 ; 12refs
Prepared for the 57th annual meeting of the Transportation Res. Board. Research funded by Dept. of Transportation.
Availability: In HS-026 765

HS-026 767

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)

The adverse effect of a bad choice of pad combinations on braking stability and traffic safety is explained, using a friction-coefficient-scatter diagram. Vehicle adjustment can be considerably affected by change in friction coefficients of brake linings on rear and front axles. Manufacture-related scatterings of friction coeficients are partially responsible for this, along with friction coefficients that can occur during vehicle operation. A case in point is the increase in brake disk temperature during prolonged downhill driving or frequent braking at high speed. Using temperature variation at front and rear axles as a function of time, it is shown how vehicle brake adjustment changes as a function of temperature with prescribed changes in friction coefficient. Basic temperature calculations for vehicle brakes are given for heating in the braking phase and cooling. Various driving cycles are described (normal load for a brake system, downhill travel as an extreme load, and a collective load for a city bus). The dependence of brake lining friction coefficients on fabrication scatterings and friction surface temperatures is discussed, and the impact of brake lining temperature behavior on the locking sequence is examined.

by Karlheinz Timtner; Detlev Duchstein
Publ: ATZ Automobiltechnische Zeitschrift v81 n5 p221-6 (1979)
1979 ; 12refs
Translated from German (original 6p; translation 13p).
Availability: See publication

HS-026 768

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES

Sixteen gas analyzers were used to measure emissions into and out of the catalytic converters while conducting Environmental Protection Agency vehicle test procedures. A computer system controlled the analyzer consoles, logged test data, and provided test results quickly. The data logged by the computer during testing was transmitted on command to the GM Res. Labs (GMR) Data Center, where data reduction was done, because it has a large computer to do the calculations, and programmers to maintain the reduction programs. The test summary can be transmitted back to the test site. The system was tested extensively to verify accuracy of results. Gas analyzers were calibrated, data logging and handling were checked, and the data reduction programs were scrutinized. The major programs involved are calibration, predata entry, range table edit, scheduled testing, post test data entry, data file edit, data transmission to data center, and summary receive and print. The system has given consistent results during its operation.

by Norman W. Laursen
General Motors Res. Labs., Instrumentation Dept., Warren, Mich.
Rept. No. SAE-790082 ; 1979 ; 12p 4refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 769

COMPUTERIZED FACILITY FOR ENGINE DEVELOPMENT

Design improvements made on a 20-year-old engine testing facility are discussed. Significant improvement was obtained with computer controlled data acquisition and permanent storage; computer generated volt/time test tables for automatic speed and torque durability testing; a data processing facility for formatted hard copy and plots; a new dynamometer system including wound armature d.c. dynamometer, solid state control for improved speed and torque control, road load, windage, and inertia simulation, and circuit module to directly interface computer to dynamometer controls. Other improvements featured a palletized engine to minimize installation time to dynamometer; a stand-alone Data Acquisition and Control Console installed to improve operator control and safety; alarm display system to minimize trouble shooting down time; modular concept for instrumentation trouble shooting and repair; a speed modulated spark angle measurement system; a dynamic fuel measurement circuit; a multi-range air rate measurement system; and utilization of wire routing, control isolation and grounding techniques. The changes provide development personnel with improved data accuracy and formatted test results in much less time. Data output, based on the number of tests performed, has doubled. Flexibility of basic controls, instrumentation, and computer applications has facilitated compliance with requests for special instrumentation and/or data, although software programming work load has increased. Similarity of the test cells has several advantages: permitting flexibility in their assignment to development projects, and facilitating trouble shooting, repair and preventive maintenance, as well as the on-going updating of the cells by allowing one design of an improvement to be applied to all cells.

by Henry J. Ciolli
Genral Motors Corp., Engineering Staff
Rept. No. SAE-790084 ; 1979 ; 19p 2refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 770

HOW TO BUY A TRUCK FRAME FOR A UTILITY VEHICLE

Engineering considerations are discussed which are involved in the proper selection of a medium or heavy duty truck frame for utility vehicles, with primary emphasis on the mounting of aerial devices, including digger derricks, hoists, cranes and man lifts. The truck chassis and utility body with aerial device must be compatible and assembled by expert personnel; the aerial device must be of proper size and capacity to handle the loads with an adequate safety margin. Choice of mounting location and method is dictated by the function of the aerial device and by load capacity, cargo space and body requirements. The chassis must have the necessary frame and suspension characteristics to mount and support the device with utility body under all dynamic and static operating conditions. The following chassis terms are explained: "moment of inertia", "section modulus", "yield strength", "bending moment", "resistance bending moment", "torsional resistance", and "stability", all of which affect a structure's ability to carry load and resist deflection. The qualities of front and rear axles, springs and brakes are also discussed. Considerations necessary in locating the aerial device on the chassis include: use of a subframe, back-of-the-cab location of the pedestal, need for full length contact between the mounting plate and truck siderails, and method of attachment.

by E. T. Hendzel
Ford Motor Co.
Rept. No. SAE-790086 ; 1979 ; 7p 3refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 771

HOW TO BUY A BODY FOR A UTILITY TRUCK

In developing specifications for a body of a utility maintenance and construction vehicle, all its possible uses must be considered. Choices for gas, telephone and electrical power company vehicles are made among the light-duty service vehicles, with chassis of less then one ton capacity, or the heavy-duty maintenance vehicles for city, rural, or special use. Items to be considered include the chassis (clearance, accessibility, center of gravity); the load requirement; auxiliary equipment, both driven from the main engine and self-powered; safety equipment; security; personnel accommodation; weather protection; sound deadening qualities; color and paint; and cost recovery. For special use vehicles, fiberglass or aluminum is preferable to steel because of rust. The three basic types of utility body construction are the welded steel body (average life of ten years); the second in popularity, an aluminum body on a steel frame, made by aircraft-type riveting and aluminum welding (body life of up to 20 years); and the more recent fiber-glass body on a steel frame (life expectancy of at least 20 years). This type is highly resistant to rust, but the cost is considerably higher.

by Charles W. Grose
Power Authority for the State of New York, Niagara Power Proj.
Rept. No. SAE-790088 ; 1979 ; 7p
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 772

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS

Engine tests were conducted to determine the effects of various full flow and by-pass lubricating oil filter combinations on diesel engine wear. The filter performance was determined by measuring the wear of piston rings, main, and rod bearings in a Cummins NTC-335 engine, after contaminating the lube system with a known amount of AC Fine Dust to accelerate wear. Comprehensive tests of over 200 different types of filter media showed that only the stacked disc spin-on by-pass filter and the conventional 750 depth-type filter reduced engine wear effectively by controlling the small abrasive particles in the oil. These two filters were equally effective in reducing engine wear. The pleated paper spin-on by-pass filter passed bench test requirements, but was ineffective in actual engine wear tests. A reduction in engine oil capacity of 7.57 liters (2 gallons) did not substantially affect engine wear, but reduced oil capacity may affect maintenance intervals. Engine wear was directly related to the degree of filtration of the by-pass and full flow filters and the levels of abrasives left in the oil. The use of the combination full flow and by-pass filter system can reduce the wear rate to less than 1/2 that resulting from use of a full flow only filter system. Due to extended engine life with use of an effective by-pass filter, the extra cost of installing and maintaining the by-pass filter is recovered many times over, providing the lowest total cost for the engine user.

by O. H. Phillips; P. D. Lane; M. C. Shadday
Fleetguard, Inc.; Cummins Engine Co., Inc.
Rept. No. SAE-790089 ; 1979 ; 16p 7refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 773

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES

Passenger car engine lubricating oil filter advancements have been made to improve filter reliability. The design consists of a dual media laminate for greater dirt holding capacity and improved resistance to higher crankcase oil temperatures. Laboratory bench testing shows significant advances in dirt holding capacity for dual vs. single media filters; data on tests are provided. Filter testing, with a fleet of 15 delivery vans, showed service life to be at least 15,000 miles with potential for longer service. Evaluation is continuing on engine-related results, and development is proceeding on a "new generation" filter intended to possess even greater heat resistance performance, utilizing the dual media concept with synthetic fiberfill in the primary media itself. Improvements are also being made to the sealing gasket compound to insure seal integrity under severe heat conditions.

by Theodore C. Sauer; Richard F. McGillick
Purolator, Inc., Purolator Filter Div.
Rept. No. SAE-790090 ; 1979 ; 8p 3refs
Technical Paper Series. Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979
Availability: SAE

HS-026 774

MOTOR GASOLINES, WINTER 1978-79

Various refiners, motor manufacturers, and chemical companies collected 2,358 samples of motor fuels from service stations throughout the country. The samples were analyzed and the data submitted to the Bartlesville Energy Technology Center (BETC) for study, necessary calculations, and compilation, under a cooperative agreement between the BETC and the American Petroleum Institute. The samples represent the products of 52 companies, large and small, which manufacture and supply gasoline. These data are tabulated by groups according to brands (unlabeled) and grades for 17 marketing areas and districts into which the country is divided. A map shows marketing areas, districts, and sampling locations, and charts indicate the trends of selected properties of motor fuels since 1946. Twelve octane distribution percent charts for areas 1, 2, 3, and 4 for unleaded, regular, and premium grades of gasoline are presented. The antiknock (octane) index (RM)/2, averages of gasolines sold in this country were 88.7, 89.6, and 94.2 unleaded, regular, and premium grades of gasolines, respectively. Significance of the data presented is not discussed.

by Ella Mae Shelton
Bartlesville Energy Technology Center, Bartlesville, Okla.
Rept. No. BETC/PPS-79/3; DOE-110 ; 1979 ; 83p 4refs
Sponsored in part by American Petroleum Inst.
Availability: NTIS

HS-026 775

LAWS FOR LAWS' SAKE? [VEHICLE RECALLS]

Safety-related car recalls in the United States are considered in relation to similar proposed legislation in Great Britain. Even though government requires the motor industry to spend large sums of money on developing safer, cleaner, and more fuel-efficint vehicles and juries award significant damages against manufacturers in product liability cases, measures to assure that car owners keep their vehicles in good repair are sketchy. It is estimated that $20 billion of $50 billion spent on car repairs annually involve unnecessary or fraudulent work. The Center of Auto Safety, established by Ralph Nader in 1979, indicates that car problems represent the largest source of consumer complaints. The U.S. accident rate is 3.3 deaths per 100 million miles, compared with 4 deaths in Great Britain and Norway, 7.9 in West Germany, 8 in France, 22.5 in Portugal, and 32.2 in Turkey. In 1978, 13.5 million cars were recalled for the correction of defects; 14.5 million tires produced by Firestone were recalled. Ford had the most recalls, with 37 recall campaigns involving 3.6 million vehicles. Ford's biggest problem was the recall of 1.4 million Pintos and Mercury Bobcats because of "rolling bomb" rear collision fires and consequent deaths. Transmission slippages were also a problem. Cited examples demonstrate the range of safety-related recalls in the United States and the requirement that manufacturers guarantee emission control equipment for 50,000 miles or five years. Also mentioned are "secret warranties" and fraudulent warranty practices.

by Tony Howard
Publ: Autocar v151 n4316 p30-1, 33 (28 Jul 1979)
1979
Availability: See publication

HS-026 776

MOTOR COPS

Dangers related to the work of motorcycle police officers are considered. Motorcycle cops are generally used by law enforcement agencies because motorcycles are more maneuverable than cars and the combination of maneuverability and power-to-weight ratio makes motorcycles ideal pursuit vehicles. A disadvantage of motorcycles is the high cost of operation. Since motorcycles are personal machines by nature, suited to only one rider, they cannot be shared by two or more shifts like patrol cars. The man-hour cost of operating motorcycles is significant, including the increased accident risk to motorcycle police officers since they operate mainly during peak traffic hours. The evolution of police motorcycles from Harley Davidson to newer Japanese models is described. Although various types of motorcycles have been developed to minimize hazards and mechanical failure, road conditions still have to be taken into account. Weather changes can seriously affect road conditions. Foggy weather is more dangerous than rainy weather in terms of visibility. Ways to maintain safety during motorcycle operation are noted, and a training course for motorcycle police officers is briefly described.

by Ken Lee
Publ: Cycle v30 n9 p67-71 (Sep 1979)
1979
Availability: See publication

HS-026 777

ACCIDENTS INVOLVING HANDICAPPED DRIVERS

The development of adaptive aids to enable handicapped people to operate a motor vehicle is reviewed, including a summary of the literature on driving by the handicapped. Standards developed by the Veterans Administration (VA) for such aids affect only a small group of the handicapped driving population. Previous studies comparing accident involvement of physically impaired with nonimpaired drivers suggest that the assertion that handicapped drivers are especially safe is based on weak and conflicting evidence. The relative accident involvement of handicapped drivers, restricted to use of full hand controls, was compared to that of other drivers. A driver population file of 8,698,536 New York State drivers was examined, including various groups of the handicapped, notably 3,336 drivers restricted to use of full hand controls. The control group was limited to 120,934 drivers, randomly selected. The data show that handicapped drivers using full hand controls had a statistically significant higher accident rate (per driver) than other drivers, and that their accidents differed significantly from those of other drivers by several accident variables such as weather conditions, road system, and accident type. The relative driving exposure of each group should be taken into account, as well as driver experience and the reliability and state of wear of the special mechanical equipment. It is concluded that although handicapped persons are not necessarily poorer drivers, they need adequate equipment, training, and driving experience to meet or exceed the safety records of other drivers. Additional studies are recommended.

by D. Barry Negri; Richard Ibison
New York State Dept. of Motor Vehicles; National Hwy. Traffic Safety Administration
Publ: Journal of Traffic Medicine v7 n2 p23-6 (Jun 1979)
1979 ; 17refs
Based on paper by D. Barry Negri (HS-803 610), sponsored under Contract DOT-HS-4-00936-5.
Availability: See publication

HS-026 778

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978

A study was conducted to reveal the relationship between driving while intoxicated incidence and knowledge of the new law concerning drinking and driving, in southern Finland. Twelve roadside surveys with a total of 43 single controls were conducted in five communities, on Friday and Saturday nights during spring and summer 1978. All passing motor vehicles were controlled by the police, 2074 drivers were given breath tests with the Alcolmeter, and a random sample of 500 drivers was interviewed. A positive alcohol result was obtained for 1.7% of all drivers. In six cases (0.3%) the blood alcohol result was between 0.50 and 1.50 per mille and in five cases (0.2%) it exceeded 1.50 per mille. These results suggest that the incidence of drunken driving during spring and summer weekends seems to be quite low in the examined areas. Driver interviews revealed that on an average, 41% knew exactly the statutory blood alcohol limits, and 56% had no idea of the penalties for drunken driving. Of all interviewed drivers, 7% were abstainers, with no reason to be aware of the drunken driving law.

by Antti Penttila; Martti Maki; Jarmo Pikkarainen
Publ: Journal of Traffic Medicine v7 n2 p30-2 (Jun 1979)
1979 ; 17refs
Sponsored by The Central Organization for Traffic Safety in Finland.
Availability: See publication

HS-026 779

A BRIGHT FUTURE FOR WHEEL BALANCING

Safety and performance factors in automobile tire manufacture and use are discussed, particularly for radial tires. The most common factor affecting the performance of belted, high-mileage radial tires is uneven tolerance or nonuniformity in the match between tire and wheel. A tire, being elastic in nature, conforms to the shape of the wheel. Thus the tire will not be round if the wheel is not perfectly round, causing problems in vehicle ride. Various densities of rubber in a molded tire cause different flexing characteristics of radial sidewalls to occur, a condition labeled radial force variation. Test results by General Motors, Uniroyal, General, and other tire manufacturers show that the field service concept where tire and wheel are adjusted (matched) to compensate for radial force variation can eliminate most vehicle vibration. Tire matching is a two-step process that involves the coordinated use of two machines, the Tire Matcher system developed by Autodynamics/Ride Control and an advanced, solid-state two-plane wheel balancer. Electronic wheel balancers are designed to deal with static, dynamic, and couple imbalance by electronically splitting a tire in half and evaluating each half independently. Tire matching detects uneven tolerance in a tire-wheel assembly under simulated driving conditions and removes these variations to assure a smoother ride. Important changes affecting ride quality in cars of the future concern car weight, small-diameter wheels, and an increase in air pressure to lower a tire's rolling resistance. Costs associated with tire matching are examined, as well as the significance of increased tire matching business to the tire service industry.

Publ: NTDRA Dealer News v42 n14 p11-4 (23-30 Jul 1979)
1979
At head of title: The Tire Service Specialist. Based on information furnished by Autodynamics/Ride Control Systems, Inc., Tampa, Fla.
Availability: See publication

HS-026 780

IT'S TIME TO "CRY HAVOC"

The causes of the present heavy highway fatality rate are reviewed, with the preventive measures that could improve the situation. Stress is laid on the responsibility of the individual to family and friends in preventing anyone from driving who has had too much to drink. The use of motorcycle helmets is urged. Since 1976, when Congress revoked the Federal authority to impose sanctions against states without a mandatory helmet law, 26 states have either repealed or weakened their helmet use laws. Motorcycle deaths increased by 24% in 1977, to an all-time high of more than 4100, and increased another 5% in 1978. Studies show that helmet usage in states with mandatory laws is about 94%, but drops to 60% or lower in states without such laws. Seat belt usage in the U.S. is very low (about 14%) and there is no public support for mandatory seat belt laws. Starting in model year 1982, automatic restraint systems such as air bags or automatic belts will be required in the front seats of all full-sized cars; by model year 1984, all passenger cars will be required to have automatic restraint systems, type unspecified, but above a certain level of protection. It is estimated that 9,000 lives may be saved each year by this requirement. A successful effort has been made to produce prototype Research Safety Vehicles demonstrating the possibility of designing smaller cars that are at once safe, fuel efficient, low polluting, practical and economical. Some aspects of this research have been put into some production cars, but the superior performance of the prototype research vehicles is not yet matched by any manufacturer.

by Joan Claybrook
Publ: AAAM Quarterly Journal v1 n3 p13-4 (Jul 1979)
1979
Availability: See publication

HS-026 781

PHYSICIAN REPORTING OF THE IMPAIRED DRIVER

Legislation is recommended to require physicians to report driver disabling medical conditions. The principle of confidentiality of medical information is not abridged when it is necessary to protect the individual or the community. Alcohol impairment, neurological and mental disorders and medically restrictive conditions such as diabetes and cardiac disease, as well as fatigue, stress, and minor but temporarily endangering diseases which diminish driver attention comprise the largest groups of conditions that affect driving. The early work of Dr. Fletcher Woodward in advocating the modern multidisciplinary approach to traffic medicine is cited. Rights of highway users, workers and children to be protected from impaired drivers are discussed. Physicians are urged to acquaint legislators with the need for legislation permitting reporting of conditions medically endangering to the public and the individual, while providing legal immunity for the reporting physician.

by James C. Andrews
Publ: AAAM Quarterly Journal v1 n3 p17-8 (Jul 1979)
1979
Reprinted from Virginia Medical n105 p872-3 (Dec 1978).
Availability: See publication

HS-026 782

12-VOLT AUTOMOBILE VACUUM CLEANERS

Advantages and disadvantages of automobile vacuum cleaners are explored. Of products from three manufacturing firms, testing by Consumers' Research Magazine indicated that all vacuum cleaners had a fair ability to remove soil embedded in the nap of rugs, but because of the limited suction, only small stones (less than 1/8 in) could be picked up. Most vacuum cleaners removed sand that had been sprinkled on the rug surface and they were almost as effective as a regular canister in the removal of dust and fine debris on smooth surfaces. Crevice tools were effective in getting into narrow spaces next to the center console in cars equipped with bucket seats. In most of the 12-volt vacuum cleaner models tested, suction is produced by a motor-driven impeller revolving at high speed that draws dirt into the nozzle and removes it from the air stream by a single-cloth filter. Filtered air then flows past the impeller and is discharged under pressure back into the car. Design factors to consider in the selection of an appropriate vacuum cleaner type are identified. Information on automobile vacuum cleaner ratings is presented.

Publ: Consumers' Research v62 n8 p12-5 (Aug 1979)
1979
Availability: See publication

HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT

Cross-correlation, time-series-modelling and multiple regressio analyses were utilized with available data from sources i Michigan to explore causal relationships between beverage alcohol licensing actions of the Michigan Liquor Control Commission, alcohol beverage distribution, and a number of majo social and health problems. While conclusions are not definitiv because of limitations in the data, it was found that mortalit due to traffic accidents, occupational accidents, and total reported accidents is strongly and consistently associated with increases in alcohol availability and with draught and package beer distribution. Other analyses using time-series analysis techniques determined that beverage alcohol distribution is highl predictable. Multiple regression analyses, interpreted in connection with the other findings, suggested that wine distribution probably more vulnerable to changes in licensing activities tha beer or liquor distribution. Implications of the findings an suggestions regarding data collection adequacy in Michigan ar offered. Appended are time-series plots of selected Michiga alcohol consumption and distribution of licensing variables wit selected Michigan health and social problem frequencies, and graph of the estimated population of Michigan, 1970-76.

by Richard L. Douglass; Alexander C. Wagenaar; Patrick N. Barkey
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-10-I ; 1979 ; 149p 141refs
Rept. for Oct 1977-Sep 1978. Sponsored by Michigan Dept. of Public Health.
Availability: Corporate author

HS-026 784

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT

by Richard L. Douglass; Alexander C. Wagenaar; Patrick M. Barkey
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-10-II ; 1979 ; 31p 5refs
Rept. for Oct 1977-Sep 1978. Sponsored by Michigan Dept. of Public Health. For abstract, see HS-026 783.
Availability: Corporate author

HS-026 785

MOTORCYCLE SAFETY EDUCATION AND LICENSING

Existing motorcycle driver licensing and driver education laws were reviewed, as well as regulations relating to motorcycle driver licensing and motorcycle safety education, and model legislation incorporating the best of current practices was prepared. Two resulting model programs are outlined: the Model Motorcycle Driver Licensing Program and the Model Traffic Safety Education Program. Both contain statutory guidelines to be incorporated into the state's statutes, and implementation guidelines suggesting the substance of necessary or desirable administrative regulations to implement the statutes. An analysis of the existing laws and regulations of the states is also presented.

National Com. on Uniform Traffic Laws and Ordinances
1978 ; 117p refs
Sponsored by Motorcycle Safety Foundation.
Availability: Motorcycle Safety Foundation, 780 Elkridge Landing Rd., Linthicum, Md. 21090

HS-803 668

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT

The relationship is examined among automotive fuel economy, ambient temperature, cold-start trip length, and drive-train component temperatures of four 1977 vehicles, one each from the sub-compact, compact, intermediate, and full-size classifications. Fuel economy, exhaust emission, and drive-train temperatures were measured at ambient temperatures of 20 degrees F, 45 degrees F, 70 degrees F, and 100 degrees F, using the 1975 Federal Test Procedure (75 FTP) and the EPA highway fuel economy test (HWFET). Appended are vehicle description and fuel inspection data, and data on fuel consumption and emissions; fuel consumption, emissions, and trip distance; fuel consumption at 1-mile intervals of the FTP; engine and drive-train temperatures; and steady-state temperatures, torque, and fuel consumption. At 20 degrees F ambient temperature, the fuel economy for a 3.6-mile cold-start trip was only 47% of the warmed-up 70 degrees highway fuel economy; the cold-start 31.6-mile trip at 20 degrees F ambient temperatures shows fuel economy of 78% of the 70 degrees highway fuel economy. Cold-start trips at 70 degrees F show respective values of 65% and 86%. Short cold-start trips have a drastic influence on carbon monoxide and hydrocarbon emission rates, with greater effect at decreasing ambient temperature. Oxides of nitrogen were only slightly affected by the change in temperature and trip length for the conditions of the study. The effect of cold-start trip length on fuel economy was similar for the four tested vehicles, and results indicate that the driving duty cycle has a marked effect on cold-start short trip fuel economy; for estimates of fuel usage and effects of vehicle changes on fuel economy, driving patterns used to measure trip effects should cover a range of duty severity. The ambient temperature affected the rate of warm-up of the transmission fluid and differential more than it did engine oil. The data indicate that current-production autos suffer as much as somewhat older models in the ratio of cold start to warmed-up fuel economy and emissions penalty; much further improvement is possible in cold weather fuel economy and emissions.

by B. H. Eccleston
Department of Energy, Bartlesville Energy Res. Center, P.O. Box 1398, Bartlesville, Okla. 74003
RA-76-48
Rept. No. DOT-TSC-NHTSA-79-43 ; 1979 ; 122p
Rept. for Feb-Sep 1977.
Availability: NTIS

HS-804 460

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT

The development of the Master Product Schedules for the major U.S. automotive manufacturers resulted directly from work performed on the design of the Automotive Manufacturing Assessment System data base, a system to assist in the evaluation of industry's capability to produce fuel-efficient vehicles. Through extensive research and synthesis of publicly available information, the schedules were generated to portray chronologically, current and future product changes and technological advances for each domestic automobile (1975-1985), light truck (1975-1980), and selected import manufacturers (1975-1980). The schedules show (by make, model, and year) all new vehicle introductions, highlighting downsizing; styling changes; and significant technological advances in the areas of engines, transmission, fuel metering, emission control, and safety. Extensive notes and reference lists are tabulated. The Master Product Schedules are given for General Motors, Ford, Chrysler, American Motors, International Harvester, Toyota, Datsun, Honda, Subaru, Mazda, Volkswagen, Fiat, British Leyland, Volvo, Mercedes-Benz, and Saab.

by Theodore Taylor, Jr.; Alan R. Cunningham; Madelyn C. Isaccs; Dominic Iannelli
Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154
DOT/TSC-1383
Rept. No. DOT-TSC-NHTSA-79.29.I ; 1979 ; 239p
Rept. for Jun 1977-Aug 1978. Vol. 2, Product Schedules of Engine/Drivetrain Combinations, is HS-804 461; Vol 4, Engine Manufacturing Analysis, is HS-804 463.
Availability: NTIS

HS-804 720

WEIGHT STUDY: 1978 CHRYSLER OMNI. FINAL REPORT

Results are presented of a weight study on a standard 1978 4-door hatchback Chrysler Omni. All components were disassembled, weighed, photographed, analysed for material content, and the manufacturing process determined. The study was designed to develop baseline data on automobile material usage, structural design, and weights, for use in future studies relative to improvements in fuel economy for the automobiles of the

1980's. In addition to body weight and chassis weight data tables, photographs of all disassembled components are presented, as well as graphic illustrations showing construction of major Omni body and chassis components. A cost/teardown study had previously been made on a 1976 VW Rabbit; because of the similarity of the two vehicles and availability of the data, comments are also made on significant differences between the two vehicles.

by Norman F. Ludtke
Corporate Tech Planning Co., 275 Wyman St., Waltham, Mass. 02154; Pioneer Engineering and Mfg. Co., 2500 East Nine Mile Rd., Warren, Mich. 48091
DOT-HS-7-01789
1978 ; 243p
Rept. for Jul-Aug 1978.
Availability: NTIS

HS-804 775

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT

Charles River Associates, 200 Clarendon St., Boston, Mass. 02116
DOT-HS-7-01779
1979 ; 27p 16refs
Rept. for Oct 1977-Apr 1979. For abstract, see HS-804 776. Cover date is Apr 1978.
Availability: NTIS

HS-804 828

DETERMINATION OF TIRE QUALITY FROM NONDESTRUCTIVE INSPECTION. FINAL REPORT

A study was performed to determine the capability of an ultrasonic inspection system developed at the Transportation Systems Center to identify anomalies in tires which would cause failure during the compliance test under Federal Motor Vehicle Safety Standard 109 and to identify degradation of tires which had passed the compliance test by subsequent examination. In a population of 1440 tires, it was found that all tires which failed the compliance test had multiple anomalies detected previously by nondestructive inspection (NDI). It was not possible, a priori, to determine which of these anomalies would lead to failure. A ranking procedure was developed which utilized the NDI results and other factors to grade and rank each tire. By statistical analysis a threshold grade was determined to separate the groups in which all tires passed the compliance test from the groups which contained tires that failed the test. The confidence level in the nonrandom nature of this threshold is near 99%. By subsequent NDI, it was found that 43 tires which had passed the test had undergone some degradation. Copies of the NDI printouts are included.

by Stephen N. Bobo
Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-NHTSA-79-30 ; 1979 ; 65p 4refs
Rept. for Sep 1975-Mar 1979. See also HS-805 829--HS-805 830
Availability: NTIS

HS-805 029

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT

Data were compared from 134 tires prior to and after road tests in order to determine whether excessive tread wear could be related to characteristics detected by ultrasonic inspection. The comparative analysis revealed that nine tires had substantial changes which may be related to abnormal tread wear. Five tires developed radial runout or shape discontinuities in the sidewall; the other four had shoulder variations. Copies of the printouts from the nondestructive inspections are included.

by George Berube
Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-NHTSA-79-48 ; 1979 ; 38p 2refs
Rept. for Jan 1977-Jun 1979. See also HS-804 828 and HS-805 030. Title page reads: Report of Pre and Post Road Test....
Availability: NTIS

HS-805 030

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT

Thirty-four retreaded tires were inspected using reflection ultrasound nondestructive inspection (NDI), wheel tested, and then subjected to failure analysis by sectioning. The results demonstrate for the first time the ability of ultrasound to identify and classify tire defects which lead to failures. The NDI identified five tires which had major flaws, predominantly (tread or belt edge) separations, and five tires with minor flaws. The wheel test was an 8-hr, full-load 55 mph test in which six of the 34 tires failed. All six failed tires were analyzed by Fabric Res. Labs., and the results were compared with flaw assessments made by NDI. All six failed tires came from the ten identified by NDI as having flaws, five of which were identified as having major flaws by both NDI and failure analysis. Copies of the NDI printouts are included. It is recommended that the National Hwy. Traffic Safety Administration use the ultrasonic inspection technique to support its ongoing rulemaking and enforcement activities, particularly in the area of identifying and defining separations as cited in Federal Motor Vehicle Safety Standard (FMVSS) 109, New Pneumatic Tires, and buff damage as cited in FMVSS 117, Retreaded Pneumatic Tires.

by Stephen N. Bobo
Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-NHTSA-79-51 ; 1979 ; 87p 6refs
Rept. for Feb 1977-Mar 1978. Includes rept. on failed tire analysis by Fabric Res. Labs., Contract DOT-TSC- 317. See also HS-804 828 and HS-805 029.
Availability: NTIS

HS-805 049

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT

The potential application of an anticipatory radar braking system in preventing motor vehicle accidents is studied. The design of the experimental radar braking system is described, as well as the installation of the system on two test vehicles (1977 Ford Granada and 1977 Plymouth Fury). A summary of the functional tests which demonstrate the performance of the experimental system is included. The design of the radar sensor is outlined, including the signal processing electronics, control panel display, and installation of the entire subsystem on the test vehicles. The design of the brake actuation subsystem and the anti-lock subsystem are described, including installation information. Functional tests were conducted with the two test vehicles equipped with the radar braking system to demonstrate its performace. There were significant differences in performance between the two radar-equipped vehicles. Braking response differences were apparently caused by mechanical differences in the vehicles' foundation braking systems, although the response characteristics of both systems were somewhat higher than desired. Both systems braked early on dry pavement at low speeds. Braking distances at higher speeds were marginal on dry pavement due to slow brake response time. Wet pavement performance was degraded because of reduced coefficient of friction. Better braking performance was achieved with anti-lock braking in operation (shorter braking distances and maintenance of better lateral stability). More extensive tests of the radar braking system installed in the test vehicles are recommended. Because of the experimental nature of the system and potentially severe consequences of closed loop operation, it is recommended that vehicle testing be restricted to dedicated sites and conducted by qualified test drivers.

by William R. Faris; Carl P. Tresselt; Henry C. Yee
Bendix Corp., Res. Labs., Southfield, Mich. 48076
DOT-HS-6-01450
Rept. No. 8904 ; 1979 ; 229p 8refs
Rept. for Sep 1976-May 1979.
Availability: NTIS

HS-805 051

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS

The initial phase is described of a two-phase project on the visual, on-the-road detection of persons driving while intoxicated (DWI), designed to develop and test procedures for enhancing on-the-road detection of DWI. The emphasis of the first phase was on the identification of visual cues and the development of procedures that effectively discriminate between DWI and driving while sober (DWS). The literature was reviewed, expert opinion was surveyed, 1288 DWI arrest reports were analyzed, and an on-the-road detection study was conducted, during which trained observers accompained police officers on patrol and recorded 643 instances of driving behavior and vehicle actions that deviated from normal. In each instance, the patrol officer stopped the vehicle and measured the blood alcohol concentration (BAC) of the driver with a portable breath tester. A DWI detection guide was developed to facilitate the application of research findings to the on-the-road detection of DWI by police patrol officers. The guide consists of 23 visual cues, with each cue given a value reflecting its ability to discriminate between DWI and DWS, and a set of three rules for estimating the probability of DWI for any set of observed cues. The 23 cues accounted for 92% of the cues observed during the detection study. It was concluded that alcohol-induced driver impairment is exhibited in the functions of steering and velocity control, time-sharing of attention, and information processing; that most detection events can be accounted for by a relatively small number of cues; that certain subsets of cues frequently occur together; that visual detection cues vary in the frequency they occur with DWI and in their discrimination ability; that conditions under which cues are observed have relatively little influence on cue occurrences; and that patrol strategy affects the relative frequencies with which cues are observed. A field test of the DWI detection guide is recommended to evaluate the guide prior to its widespread use.

by Douglas H. Harris; James B. Howlett; R. Glen Ridgeway
Anacapa Sciences, Inc., P.O. Drawer Q, Santa Barbara, Calif. 93102
DOT-HS-7-01538
Rept. No. 321-1 ; 1979 ; 139p 25refs
Rept. for Mar 1977-Jan 1979.
Availability: NTIS

HS-805 056

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM

This manual is designed to aid service organizations and other groups in establishing an effective child restraint loan program. Reasons for a restraint loan program, administrative details, and references to groups who have operated such a program are presented. Necessary personnel and their functions, and space and supplies/equipment requirements are outlined. Acceptable types of restraints, where to obtain the first group of them, rental fees, selling restraints, and sales and use taxes are discussed. Ideas for helping others sell or swap, and attracting parents to the program are provided. The usual procedure for loaning a seat is described, and liability and evaluation of program impact are mentioned. Apended are a description of some typical programs, a shopping guide to restraints, a list of restraint manufacturers, a sample of the application for retailer's license in Michigan, sample rental form, sample return reminder letter, and addresses of governor's highway safety program offices in each state and U.S. jurisdiction, as well as other sources of child restraint informational materials (including the ten regional offices of the National Hwy. Traffic Safety Administration).

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 40p refs
Produced with materials provided by Michigan's Motor Vehicle Occupant Protection Prog., the Michigan Jaycee Auxillary, and Action for Child Transportation Safety. See also HS-805 057, HS-805 059, HS-805 060, and HS-805 176.
Availability: NHTSA

HS-805 057

EARLYRIDER FACT BOOK [CHILD RESTRAINTS]

This booklet, which provides a detailed look at currently marketed infant and toddler automobile safety restraints, is intended as a guide for community organizers of programs to increase child restraint usage, as well as a study guide in selecting seats. It can also enable observers to recognize seats during an observation survey. Common mistakes parents make in using child restraints are outlined. Restraints are divided into three major categories: those for infants only, usually up to 17-20 lb; convertible restraints which can be adjusted to face either forward or backward; and restraints designed only for children old enough to sit up by themselves in a forward-facing position. A fourth category briefly covers recently discontinued restraints (all adequate). As of Feb 1979, this is a complete listing of infant and child restraints which passed dynamic tests according to the requirements of the 1978 proposed revision to Federal Motor Vehicle Safety Standard 213. Three newly marketed restraints are included which have not been formally tested in final production configurations, but performed adequately in preproduction tests. Each restraint model is illustrated, and manufacturer, price and availability, description, and comments provided.

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 24p
Produced from materials provided by Michigan's Motor Vehicle Occupant Protection Prog., the Michigan Jaycees Auxillary, and Action for Child Transportation Safety. See also HS-805 056, HS-805 059, HS-805 060, and HS-805 176.
Availability: NHTSA

HS-805 059

EARLYRIDER PUBLICITY HANDBOOK [CHILD RESTRAINTS]

This booklet is designed to aid service organizations and other groups in developing a diverse public communications program that will effectively promote child restraint use in the community. Basic pointers for publicity are outlined, including guidelines on how to prepare information for the media (writing news relases, planning picture publicty, arranging radio and television coverage). Sample news releases are provided (start of program, incident where child properly restrainted is uninjured in a crash). Information is given on how to conduct a survey of child restraint usage in the community. A quiz is provided which can be used as the basis for an enjoyable, informative group discussion on restraint use.

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 25p
Produced from materials provided by Michigan's Motor Vehicle Occupant Protection Prog., the Michigan Jaycee Auxiliary, and Action for Child Transportaton Safety. See also HS-805 056, HS-805 057, HS-805 060, and HS-805 176.
Availability: NHTSA

HS-805 060

EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER

The goal of these educational materials for health professionals is to provide the means by which child auto safety can become a routine part of preventive care within the health community. An outline is presented of a training session for health professionals to prepare them for carrying out child restraint education for expectant parents and parents of young children. Guidelines are presented for the instructor of the training session, as well as for the health professionals (prenatal approaches to safety education, in-hospital education for the new parent). Resource materials are indicated, and a glossary provided of terms related to child restraints. Appended are demonstration techniques for infant and child auto safety restraints, and general guidelines for health professionals in promoting child restraint usage in the community.

National Hwy. Traffic Safety Administration, 400 7th St., S.W. Washington, D.C. 20590
1979 ; 29p refs
Produced from materials provided by Michigan's Motor Vehicle Occupant Protection Prog., the Michigan Jaycee Auxiliary, and Action for Child Transportation Safety. See also HS-805 056, HS-805 057, HS-805 059, and HS-805 176.
Availability: NHTSA

HS-805 100

TRAFFIC SAFETY '78. A DIGEST OF ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Key features are presented from the 12th annual National Hwy Traffic Safety Administration (NHTSA) reports as mandated b the Highway Safety Act of 1966 and the National Traffic an Motor Vehicle Safety Act of 1966. These acts require the Secretary of Transportation to report on progress made during th year in reducing traffic accidents, fatalities, injuries, and property damage. The magnitude of the highway safety problem i discussed, including persistent problems (e.g. nonuse of safet belts, drunk driving, noncompliance with 55 mph speed limi inadequate crash protection) and current trends (e.g. increase traffic fatalities and fatality rates, decreased helmet usage, growing number of trucks on the road, increased auto repair waste) Areas of activity in NHTSA'S overall safety program includ the 55 mph speed limit; van and light truck standards; chil restraint standard; fuel economy standards; pedestrian, bicycle and motorcycle safety; and alcohol involvement in accident The agency's activities to improve the safety and fuel econom of motor vehicles are described, including consumer informatio programs and recall campaigns. NHTSA'S involvement in an sponsorship of efforts to improve traffic safety are discusse Public education and the encouragement of consumer participation in traffic safety and motor vehicle matters, and NHTSA' international activities are mentioned.

National Hwy. Traffic Safety Administration, Washington, D.C 20590
1979 ; 35p refs
Availability: NTIS

HS-805 119

RULES OF THE ROAD RATED [1979]

A rating is made of state traffic laws (including those of th District of Columbia, and Puerto Rico), compared with th rules of the road part of the Uniform Vehicle Code (UVC) as c 1 Jan 1978. Prior ratings were based on state traffic laws c 1968 and of 1971 through 1976. A more precise picture of th status of state traffic laws is sought that will facilitate rapi identification of particular areas of a state's laws which do nc conform to the UVC; that will indicate areas of the statutor law where uniformity may be markedly poor nationwide; an that will identify states whose traffic laws may need immediat upgrading in order to improve highway safety. Numerical a sessments of the states are provided in 13 tables, one for eac article in the "Rules of the Road" chapter of the UVC an subdivided by section, subsection, or principle in the Code. summary table provides the number of points for each table an the total points scored for each state. The highest ranked state Kansas, the lowest is Massachusetts. Between 1976 and 197 the scores in 23 states improved while the scores in seve worsened; 22 scores remained the same. Although many stat made significant advances toward uniformity during 1969-197 200 substantial differences still remain. Almost 45% of the differences involve traffic control devices and right of way. disappointment was the failure of 14 states (mostly in the easter half of the U.S.) with poor scores to make greater progres these states accounting for a large percentage of all substanti differences.

by Edward F. Kearney
National Com. on Uniform Traffic Laws and Ordinances
DOT-HS-8-01952
Publ: Traffic Laws Commentary v8 n5 (1979)
1979 ; 31p refs
Availability: GPO

HS-805 128

AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT

A study was conducted to develop recommendations for a revision of the Federal Ambulance Specifications (KKK-A-1822), the overall goal being to determine the electrical needs of the modern ambulance and to develop a model system which is economical and energy-efficient, safe for the patient and operator, which allows future growth, and provides the maximum in reliability and maintainability. It was found that the ambulance electrical system is almost always overloaded. Options for increasing generating capacity are described (a dual alternator, and an apparatus to increase an automotive alternator's output by increasing the generated voltage). It is recommended that the balance between load demand and generating capacity be improved, a reduction in load being the preferred option. Although most electrical system configurations encountered were satisfactory, a preferred configuration is described (paralleled batteries, a manual battery selector switch, a diode isolator, and an ammeter and voltmeter). Since most electrical system faults are due to poor manufacturer quality control, it is recommended that quality control be institutionalized by the ambulance manufacturer's trade organization. Electrical load management is recommended to ambulance operators. It is shown that a harmful shock from a nominal 12 VDC (volts, direct current) source is not possible. With 110 VAC, (volts, alternating current) macroshock is possible for both patient and attendant personnel. A 110 VAC source is not needed on most ambulances. The static inverter is not recommended as a required ambulance item. A somewhat tutorial discussion is presented on nickel-cadmium and sealed lead-acid battery characteristics, including their significance to ambulance personnel. It is generally recommended that ambulance personnel follow manufacturer's recommendations. Some general guidelines on battery use are presented as well as recommended procedures in lieu of manufacturer's instructions.

by C. D. Parker; C. F. Starmer; L. B. West; J. C. Ruddle
Research Triangle Inst., P.O. Box 12194, Reseach Triangle Park, N.C. 27709
DOT-HS-7-01801
1979 ; 133p 28refs
Rept. for Sep 1977-Sep 1978.
Availability: NTIS

HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT

From a careful inspection of specimen trucks, their possible compliance or noncompliance with the requirements of Federal Motor Vehicle Safety Standard (FMVSS) 201, Occupant Protection in Interior Impact--Passenger Cars, was determined. Where noncompliance was indicated, design studies were made to bring the trucks into compliance. The added weight of the new designs was estimated, as well as the cost of the new design features (manufacturing, wholesale, dealer markup, and total consumer costs). After the average service life was established for each light truck and van make and model, a lifetime fuel operating cost was estimated. The impact on production leadtime was analyzed. Based on 1978 production volumes, the estimated average cost per truck of complying with FMVSS 201 requirements would be $4.43.

by Robert F. McLean
John Z. De Lorean Corp., Res. and Engineering Div., DMC, P.O. Box 427, Bloomfield Hills, Mich. 48013
DOT-HS-7-01770-Mod.-2
1979 ; 71p refs
Availability: NTIS

HS-805 163

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT

From a careful inspection of specimen trucks, their possible compliance or noncompliance with the requirements of Federal Motor Vehicle Safety Standard (FMVSS) 203, Impact Protection for the Driver from the Steering Control System--Passenger Cars, and FMVSS 204, Steering Control Rearward Displacement--Passenger Cars, was determined. Where noncompliance was indicated, design studies were made to bring the trucks into compliance. The added weight of the new designs was estimated, as well as the cost of the new design features (manufacturing, wholesale, dealer markup, and total consumer costs). The average service life of each light truck and van make and model was established. The impact on production leadtime was analyzed. Based on 1978 production volumes, the average cost per truck of complying with FMVSS'S 203 and 204 would be $11.35.

by Robert F. McLean
John Z. De Lorean Corp., Res. and Engineering Div., DMC, P.O. Box 427, Bloomfield Hills, Mich. 48013
DOT-HS-7-01770-Mod.-3
1979 ; 36p refs
Availability: NTIS

HS-805 164

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT

Minor changes have been proposed in a 1978 Pontiac LeMans front bumper system modified by Battelle Labs. (Columbus, Ohio) to improve pedestrian impact protection. Generally, resilient plastic foam was substituted for the rigid steel bumper components. The minor changes proposed in the prototype configuration are for improved production possibilities. A cost estimate has been made of the original production design and the revised prototype. A 12-lb weight saving and a $5.71 increase in consumer cost were found.

by Robert F. McLean; Clifford Eckel
De Lorean Motor Co., 2401 Elliott St., Troy, Mich. 48084
DOT-HS-7-01767-Mod.-4
1979 ; 34p
Rept. for Dec 1978-Apr 1979.
Availability: NTIS

HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT

A program to establish a test methodology for evaluating crash compatibility and aggressiveness of intermediate, subcompact, and lightweight subcompact cars is described. As a result of this program, the NHTSA (National Hwy. Traffic Safety Administration) Test Device was developed to measure the basic types of aggressiveness (architectural, mass, and structural). This Test Device is a unique, segmented, honeycomb, load-measuring tool which is adaptable to both moving-and fixed-barrier collisions. Eight full-scale, car-to-Test Device collisions were conducted to provide comprehensive data comparisons between moving and fixed barrier tests. The four representative 1975 models used were the Honda Civic CVCC, Volvo 244DL, Ford Torino, and Plymouth Fury. Data comparisons were also made with results of previously conducted car-to-car and car-to-fixed barrier tests. Vehicle aggressivity assessment is addressed, illustrating some simple approaches for determining the relative aggressivity of two vehicles, using the Ford Torino and Plymouth Fury as examples. Possible methodologies for assessing a vehicle's compatibility with a selected traffic scenario are also addressed. Conclusions and recommendations are presented, based on the data from the eight car-to-car tests, including recommendations for improving the design and load-measuring capability of the NHTSA Test Device and for using it in future research.

by R. Yee; R. Cropper; S. Davis; M. Shaw
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-7-01758; Ref: DOT-HS-4-01099; ref: DOT-HS-4-01104
Rept. No. 8316-78-170A ; 1979 ; 242p 14refs
Rept. for Sep 1977-Dec 1978. Test Reports 1-4 are HS-805 168--HS-805 171.
Availability: NTIS

HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT

Results are presented of two full-scale, head-on collisions between the NHTSA (National Hwy. Traffic Safety Administration) Test Device and 1975 Ford Torino four-door sedans. These are Tests No. 3 and No. 4 of a series of eight tests to help establish a test methodology for evaluating crash compatibility and aggressiveness. The NHTSA Test Device is a unique, honeycomb-faced, load-measuring tool adaptable to both moving- and fixed-barrier collisions. Data presented include graphical and tabular presentations of vehicle deformation; Test Device load cell data; vehicle and simulated occupant acceleration, velocity, and displacement values; dynamic displacement of string potentiometers, and restraint survival distances. Also included are tabular summaries of occupant injury criteria, exterior and interior static vehicle deformation, and restraint system loads and vehicle descriptions. Data for a 40-mph fixed Test Device collision are compared to those for an "equivalent" moving Test Device collision.

by R. Yee; R. Cropper; S. Davis
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-7-01758
Rept. No. 8316-78-106A ; 1979 ; 226p 1ref
Rept. for May-Sep 1978. Vol. 2, Final Technical Report, is HS-805 167; Test Report 1 is HS-805 168; Test Reports 3-4 are HS-805 170--HS-805 171.
Availability: NTIS

HS-805 170

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT

Results are presented for two full-scale, head-on collisions be
tween the NHTSA (National Hwy. Traffic Safety Administra
tion) Test Device and 1975 Volvo 244DL four-door sedan
These are Test No. 5 and No 6 of a series of eight tests to hel
establish a test methodology for evaluating crash compatibilit
and aggressiveness. The NHTSA Test Device is a unique, hon
eycomb-faced, load-measuring tool adaptable to both moving
and fixed-barrier collisions. Data presented include graphic
and tabular presentations of vehicle deformation; Test Devic
load cell data; vehicle and simulated occupant acceleration, v
locity, and displacement values; dynamic displacement of strin
potentiometers; and restraint survival distances. Also include
are tabular summaries of occupant injury criteria, exterior an
interior static vehicle deformation, and restraint system loa
and vehicle descriptions. Data for a fixed Test Device collisio
are compared to those for an "equivalent" moving Test Devic
collision.

by R. Yee; R. Cropper; S. Davis
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix,
Ariz. 85027
DOT-HS-7-01758
Rept. No. 8316-78-145A ; 1979 ; 226p 1ref
Rept. for Aug-Oct 1978. Vol. 2, Final Technical Report, is HS
805 167; Test Reports 1--2 are HS-805 168--HS-805 169; Test
Report 4 is HS-805 171.
Availability: NTIS

HS-805 175

ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT

In this first phase of a three-phase project concerned wi
national maximum speed limit (NMSL) enforcement procedur
work was undertaken to develop a profile of existing practic
techniques, and procedures used by state police and highw
patrols to enforce the NMSL. A resource document was dev
oped and distributed to the state law enforcement agencies
obtain data on personnel and equipment resources of t
agency, agency responsibilities, and procedures or patrol co
figurations by which the agency enforces the NMSL, as well
influences outside the agency which affect NMSL enforceme
Responses to the resource document (a copy of which is
pended) form the basis of this state-of-the-art report. Based
the responses, ten states were selected and visited for the p
pose of data verification and a closer examination of NM
enforcement in the field. Observations are provided on the
forcement practices of Arizona, Arkansas, California, Colora
Georgia, Iowa, Maryland, Massachusetts, New York, and Oh
The conclusion of the overall study is that state law enfor

ment agencies are enforcing the NMSL vigorously, considering available resources. Enforcement actions are taken by nearly all officers in nearly all jurisdictions when violator speeds reach 65 or 66 mph. Unusually high speed violations are rare. The majority of the public is accepting the NMSL. The respondents favored the single officer patrol unit with radar, although team configurations are very effective. Some reasonable proportion of enforcement units should be unmarked camouflaged vehicles, or aircraft, to combat the widespread use of Citizens Band radios by motorists. All on-duty units should be equipped with moving radar units. The stopwatch, the least expensive speed detection device, should supplement speedometer and radar on surface units.

by Norman Darwick
International Assoc. of Chiefs of Police, Div. of State and Provincial Police, 11 Firstfield Rd., Gaithersburg, Md. 20760
DOT-HS-6-01345
1977 ; 229p 5refs
Rept. for 15 Jun 1976-30 Jun 1977.
Availability: NTIS

HS-805 176

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS

As of Feb 1979, this is a complete listing of those infant and child restraints currently in production which have been determined to perform satisfactorily in dynamic tests according to the requirements of the 1978 proposed revision to Federal Motor Vehicle Safety Standard 213. The listing is divided into three major categories: restraints for infants only (from birth to 20 lb), convertible restraints for infants and toddlers, and restraints for toddlers only (from the time they can sit alone until they weigh 40 lb or 50 lb). Information is given on the reasons for infant and child restraint use, the selection of the most suitable restraint, and the proper use of restraints. Illustrations are provided of the different restraint models.

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 4p
Produced from materials provided by Michigan's Motor Vehicle Occupant Protection Prog., the Michigan Jaycee Auxiliary, and Action for Child Transportation Safety. See also HS-805 056, HS-805 057, HS-805 059, and HS-805 060.
Availability: NHTSA

HS-805 177

MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT

Planning phase efforts are described in the selection of a methodology for conducting a multilevel study of accident causation and avoidance. The steps required to achieve this goal were definition and development of an accident-causation model, identification of research topics for further study, and development of experimental projects for studying the selected factors. A review of highway-related literature showed that the case study approach has been the basis of most previous accident-causation research. The medical literature suggested an alternative in the statistical inference approach, a probabilistic model. The characteristics of the two approaches are described and the probabilistic model is recommended for the Phases 2 and 3 research. This approach can deal with complex, interactive phenomena by isolating the influence of particular factors and is compatible with the National Accident Sampling System. It is recommended that the statistical inference approach be formulated in terms of multidimensional contingency tables. Three sampling techniques, commonly used in epidemiology, that give rise to contigency tables, are reviewed. Experimental projects are described for the following three research topics: accident experience in stolen vehicles (illustrating cross-sectional sampling), comparative accident experience of field-dependent drivers (prospective sampling), and comparison of tire characteristics (vehicle stability studies) in the accident and non-accident populations (retrospective sampling). Appended are a bibliography (with annotations or author abstracts), a report on the traffic conflicts technique (and its applicability to accident-causation research), and a review of the concept of induced exposure.

by Lyle D. Filkins; Robert E. Scott; James O'Day; Michael Kubacki
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
DOT-HS-7-01669
Rept. No. UM-HSRI-78-38 ; 1978 ; 108p refs
Rept. for Oct 1977-Sep 1978.
Availability: NTIS

HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT

The results and conclusions are summarized of a study to determine whether there are feasible and desirable activities that state agencies may perform to improve the effectiveness of motor vehicle safety defect recall campaigns. Background information is provided on the recall program and on the study itself. Results are summarized of feasibility and desirability analyses for the five most promising state activities, and a comparative evaluation is provided. The five activities include verifying compliance with safety defect recall campaigns during state safety inspections; issuance by state motor vehicle departments of follow-up recall notices; requiring franchised dealers or manufacturers to certify the compliance of all vehicles under recall when the vehicles are brought in for service or taken into inventory; production and distribution of "tearsheets" describing motor vehicle recall campaigns; and suspending registrations of recall vehicles that have not been inspected for detects and corrected, if necessary. Each of the activities was analyzed on the basis of technical, operational, and administrative feasibility; legal feasibility; political feasibility; cost; impact on campaign completion rates; and cost effectiveness. It is concluded that the five activities provide state and National Hwy. Traffic Safety Administration decision-makers with a variety of flexible, relatively inexpensive, and effective mechanisms for increasing the completion rates of motor vehicle recall campaigns.

by Barry Finkelstein; Larry Seidel; Douglas Soffer
American Management Systems, Inc., 1515 Wilson Blvd., Arlington, Va. 22209
DOT-HS-8-02029
1979 ; 137p refs
Rept. for Sep 1978-Sep 1979. Vols. 2-4 are HS-805 179--HS-805 181.
Availability: NTIS

HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT

A detailed description and results of an analysis are provided of one potential state activity to improve the effectiveness of motor vehicle safety defect recall campaigns: verifying compliance with safety defect recall campaigns during state safety inspections. The feasibility of this activity was analyzed in terms of technical, operational, and administrative feasibility; legal feasibility; political feasibility; impact on campaign completion rates; cost; and cost effectiveness. It is concluded that the activity is technically, operationally and administratively feasible in most PMVI (periodic motor vehicle inspection) states. Legal and political feasibility vary among states, but it appears that the activity is viable in some states. The activity is highly effective in increasing campaign completion rates at low state cost and moderate total cost. Implementation as a demonstration project in an interested state is justified. The activity is especially desirable for PMVI states in which the primary objective is to effect maximum completion rates for critical recall campaigns. During a demonstration project, the following issues should be monitored and resolved: extent to which private inspection stations neglect to verify recall compliance and impact of this on activity effectiveness; impact of activity on vehicle owner attitudes toward the recall program and on completion rates of nondesignated campaigns; level of public and political support generated; and impact on vehicle service and inspection industry (especially, possible shift from nonfranchised inspection facilities to franchised dealers).

by Barry Finkelstein; Larry Seidel; Douglas Soffer
American Management Systems, Inc., 1515 Wilson Blvd.,
Arlington, Va. 22209
DOT-HS-8-02029
1979 ; 184p refs
Rept. for Sep 1978-Sep 1979. Vol. 1 is HS-805 178; Vol. 3-4 are HS-805 180--HS-805 181.
Availability: NTIS

HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT

A detailed description and results of an analysis are provided of one potential state activity to improve the effectiveness of motor vehicle safety defect recall campaigns: issuance by state motor vehicle departments of follow-up recall notices. The feasibility of this activity was analyzed in terms of technical, operational, and administrative feasibility; legal feasibility; political feasibility; impact on campaign completion rates; cost; and cost effectiveness. It is concluded that the activity is technically, operationally, and administratively feasible in most states. State issuance of follow-up recall notices is likely to be legally and politically viable in many states. The activity would effect small to moderate increases in campaign completion rates at relatively low cost. Implementation of this activity as a demonstration project in one or more states is justified. The activity is especially desirable in states with excess data processing capacity and in-house printing and mailing capabilities. During a demonstration project, the following issues should be explored: impact on owner response of different approaches to designing and drafting recall notices, and practicability and cost effectiveness of coordinating state follow-up notices with manufacturer and dealer follow-up activities.

by Barry Finelstein; Larry Seidel; Douglas Soffer
American Management Systems, Inc., 1515 Wilson Blvd.,
Arlington, Va. 22209
DOT-HS-8-02029
1979 ; 135p refs
Rept. for Sep 1978-Sep 1979. Vol. 1-2 are HS-805 178--HS-805 179; Vol. 4 is HS-805 181.
Availability: NTIS

HS-805 181

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT

Background information is given on the National Hwy. Traffic Safety Administration (NHTSA) motor vehicle safety defect recall campaigns and on the present study to determine activites that state agencies may perform to improve recall campaign effectiveness. Comprehensive documentation is provided of recall program activities under the following headings: overview; NHTSA operations prior to beginning of a recall campaign; manufacturer defect determination process; initial recall campaign operations (manufacturer preparation and notification of NHTSA, vehicle owners, and dealers); R. L. Polk operations (a company which maintains files of state vehicle registration data to aid manufacturers in recall campaigns); vehicle inspection/correction and follow-up notification for uncorrected vehicles; and campaign monitoring and evaluation. Relevant programs operated by state agencies are described generally in the following section: overview, vehicle registration and titling programs, vehicle inspection programs, motor vehicle department data processing systems, and state agencies (other than motor vehicle departments) that may assist in recall campaigns. Topics in the discussion of state activities in recall campaigns include overview (recall program operation problems, state participation in recall program, preliminary assessment of potential state activities); key problems associated with current recall program operations; and potential state solutions to recall program problems. Appended are agenda employed to conduct interviews with state agency officials; reports generated from state visits in California, Florida, Massachusetts, New York, and Utah; a list of organizations and individuals contacted; and an annotated bibliography of background material.

by Barry Finkelstein; Larry Seidel; Douglas Soffer
American Management Systems, Inc., 1515 Wilson Blvd.,
Arlington, Va. 22209
DOT-HS-8-02029
1979 ; 451p 106refs
Rept. for Sep 1978-Sep 1979. Vols. 1-3 are HS-805 178--HS-805 180.
Availability: NTIS

HS-805 184

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT

Previous work conducted by individual automobile manufacturers, the Motor Vehicle Manufacturers Assoc., the National Hwy. Traffic Safety Administration, and other parties was examined to assess the magnitude of any potential risks associated with the use of air bag restraint systems. Specific potential hazards associated with the handling and disposal of inflator modules were identified, based on consideration of physical, biological, and human environmental impact. Individual amelioration techniques were examined for the various stages of the vehicle life cycle. A countermeasure analysis indicated that undeployed air bags in retired cars should be safely deployed early in the automobile recycling process. This deployment could take place at dismantler/recycler and scrapyard facilities, or at designated inspection-deployment centers. Ten modifications were identified that could be incorporated into inflator or air bag system designs to aid in deployment. The modifications, identified according to the signal source or device used to deploy the inflator module and ranked according to attractiveness, are as follows: 12-volt DC battery, piezoelectric igniter, electronic keyhole-less lock, self-ignition match pyrophoric added to the pyrotechnic material in the inflator, induction coil, ultraviolet radiation, radio frequency tuned squib, pulsed or continuous laser, microwave radiation, ultrasonic, and collapsible partition. The individual merits of these alternatives should be examined in more detail.

Arthur D. Little, Inc., Acorn Park, Cambridge, Mass.
DOT-HS-8-01995
1979 ; 129p refs
Rept. for Aug 1978-Apr 1979.
Availability: NTIS

HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT

by Rodney W. Harris; John R. Treat; Rex D. Hume
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington, Ind. 47401
DOT-HS-6-01387
Rept. No. DOT-HS-6-01387-77-TBM-Vol-1 ; 1977 ; 29p
Rept. for Jul 1976-Nov 1977. Cover date is 1979. For abstract, see HS-805 193.
Availability: NTIS

HS-805 193

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT

A project was undertaken to determine the feasibility of surveying the safety status of the truck-, bus-, and motorcycle-in-use populations (in support of the National Hwy. Traffic Safety Administration's Vehicles-In-Use Prog.), and to develop and validate a cost-effective methodology for surveying the condition of trucks, buses, and motorcycles. Phase 1 of the project established the feasibility of such surveys. Methods for inspecting each vehicle type, and data collection strategies were designed. Representatives of affected industries and owner groups were consulted to assess the feasibility of the inspection techniques and to arrive at an optimum strategy. (Details concerning the literature review, industry consultations, and other phase 1 activities were presented in an Interim Report. Summaries of these activities are included herein.) The emphasis of this report is on the detailed survey methodology developed in Phase 2. The approach adopted involves the use of a mobile inspection team to conduct inspections at six major sites representing three types of vehicle inspection programs. Inspection procedures and methods were developed and tested using time and motion studies, and validated in actual field tests. Equipment necessary to conduct inspections was identified.

by Rodney W. Harris; John R. Treat; Rex D. Hume
Indiana Univ., Inst. for Res. in Public Safety, 400 East 7th St., Bloomington Ind. 47401
DOT-HS-6-01387
Rept. No. DOT-HS-6-01387-77-TBM-Vol-2 ; 1977 ; 331p refs
Rept. for Jul 1976-Nov 1977. Cover date is 1979. For summary report, see HS-805 192.
Availability: NTIS

HS-805 205

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT

An assessment was made of the energy conservation potential of land-based recreational vehicles (RV'S) in partial fulfillment of the requirements of the 1978 Amendment to the National Energy Policy Act which mandated the Secretary of Transportation to conduct a study of the energy conservation potential of RV'S, including aircraft, motorboats, and land-based vehicles. The present analysis involved motor homes, truck campers, motorcycles, snowmobiles, golf cars, and all-terrain vehicles. Based on personal interviews and secondary data sources, it was determined that the RV population studied was about 5 million in 1978 and may increase to 6 million in 1985. Current annual fuel consumption is about 1.4 billion gallons, slightly more than 1% of total highway fuel usage. Assuming a fuel efficiency improvement between 10% and 25%, annual savings would range between 150 and 375 million gal. or between 1-1/2% and 3% of the savings expected from passenger cars and light trucks.

by Robert T. Schroth
Robert T. Schroth, 1420 White Shope Rd., Culpeper, Va.
NHTSA-9-6448
1979 ; 107p 23refs
Rept. for Apr-Aug 1979.
Availability: NTIS ar

HS-805 265

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979

Data are tabulated for motor vehicles, equipment, and tires involved in 1979 safety related recall campaigns. For each item, the make/model, model year, number of items recalled, and a brief description of the defect are recorded. Vehicles include passenger cars, station wagons, vans (camper and travel), mini-motorhomes, motorhomes, van coaches, jeeps, four-wheel-drive vehicles, trucks (light, medium, and heavy), trailers, semi-trailers logging/pulp, tank), drill rigs, buses, school buses, transit coaches, motorcycles, mopeds, postal delivery trucks, police vehicles, and fire apparatus trucks. Equipment includes hydraulic winches (wreckers), jacks, wheels, anti-lock systems, fuel filters, camper doors and refrigerators, air conditioners, shoulder belts, frame members, axles, power steering components, luggage racks (motorcycle), telescopic hoists (trucks), brake master cylinders, fuel hose, and tires. Status of recall campaigns is given as of 30 Sep 1979.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1980 ; 95p
Rept. for 1979.
Availability: GPO

HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT

by H. John Edmonds; Robert H. Hanson; David R. Morganstein; Joseph Waksberg
Westat, Inc., 11600 Nebel St., Rockville, Md. 20853
DOT-HS-7-01706
1979 ; 25p 3refs
For abstract, see HS-805 274, Vol. 1, Final Technical Report; Vol. 2, Exhibits, is HS-805 275.
Availability: NTIS

HS-805 274

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT

The Phase 2 and 3 sample design for the National Accident Sampling System (NASS) recommends a procedure for the first-stage selection of Primary Sampling Units (PSU'S) and the second-stage design for the selection of accidents for investigation. Cost models are developed to estimate the operating characteristics of the NASS. The design features extensive use of stratification and clustering. Controlled probability selection is used to insure geographic dispersion of the 75 recommended investigation sites, including the initial 10 NASS pilot sites. Two types of estimation methods were proposed, unbiased inflation estimators and ratio estimators (several types). The use of balanced half-sample replications is recommended for estimating sampling errors.

by H. John Edmonds; Robert H. Hanson; David R. Morganstein; Joseph Waksberg
Westat, Inc., 11600 Nebel St., Rockville, Md. 20853
DOT-HS-7-01706
1979 ; 144p 16refs
For summary report, see HS-805 273; Vol. 2, Exhibits, is HS-805 275.
Availability: NTIS

HS-805 298

INJURY CODING MANUAL 1980. FINAL REPORT

A medically accurate, concise, and practical handbook is provided for use by vehicle crash investigators in coding injury data. This manual incorporates all 1980 revisions to the Abbreviated Injury Scale (AIS) and provides a glossary of commonly used medical terms and symbols, anatomical outlines and charts, and National Accident Sampling System (NASS) coding conventions. Included are a brief history of standardized injury reporting systems; a description of the format and usage of the AIS; and the AIS injury scaling dictionary.

by Elaine Petrucelli; John D. States; Donald F. Huelke; Less N
Hames
Health and Safety Associates, Inc., P.O. Box 222, Morton Grove, Ill. 60053
DOT-HS-8-02015
1980 ; 117p 25refs
Rept. for Oct. 1978-Feb. 1980.
Availability: NTIS

HS-805 302

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES

The supporting documents for the final design of the Calspan
Chrysler Research Safety Vehicle (RSV) are presented. Incluc
ed are illustrations of body and chassis components; specific
tions for the RSV engine family; results of the RSV Mule C
service brake and parking brake systems tests, and of temper
ture tests; a summary of the RSV drag coefficient; and a bill
materials for the final RSV design.

by G. J. Fabian, ed.; G. E. Frig, ed.
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-7-01551
Rept. No. ZN-6069-V-23-Vol-2 ; 1979 ; 185p
Rept. for 26 Jan 1977-31 Jan 1980. Vol. 1 is HS-805 301. See also HS-805 322 and HS-805 323. Title page reads: Research Safety Vehicle Phase 3....
Availability: NTIS

HS-805 312

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL-- CASE FOR HELMET USE

An overview of the ramifications of helmet law repeal is p
sented. A brief history of the Highway Safety Acts and th
effect upon helmet laws is given. Also provided are tables a
graphs representing motorcycle fatalities per 10,000 register
vehicles. Helmet use issues are discussed, including the questio
of helmet effectiveness, the helmet's contribution to neck in
ries, and the helmet's alleged impairment of the driver's heari
and vision. Despite rapid increases in vehicle registration
tween 1958 and 1979, helmets are shown to have helped
reduce fatalities from 15 per 10,000 in 1959 to 6.4 per 10,000
1976. Post-repeal studies were contracted by the NHTSA
Kansas, Colorado, Oklahoma, and South Dakota to measure
effect of helmet laws. Specific data indicate a nearly 50% red
tion in voluntary helmet use in these states since repeal; h
injuries have increased two to three times in frequency and f
times in severity. An analysis of the additional medical c
resulting from helmet law repeal indicates increases of milli
of dollars annually for direct hospitalization and physician c
These costs are largely unpaid by the injured party and must
absorbed by society as a whole. Since the repeal or weaken
of helmet laws in 27 states in 1976, motorcycle fatalities h
increased 46% while registrations have increased only 1%. D
cussion of methods to increase voluntary use indicates a lack
knowledge of the mechanisms necessary to change rider
tudes. Congressional legislation is recommended to define
responsibilities of the states in enacting helmet use legislati

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1980 ; 116p 64refs
Prepared in response to Section 210 of the Surface Transportation Assistance Act of 1978.
Availability: NHTSA

HS-805 321

EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT

Near-term and exploratory rulemaking activities described in NHTSA'S "5-Year Plan for Motor Vehicle Safety Rulemaking" (published April 1979) are studied. Accidents and conditions in which the various standards can have effects are identified. Changes in the relative frequencies of the accident types and conditions are projected to the year 2000 on the basis of projections of the population, of highway use, and of the vehicle fleet. Changes between 1977 and 2000 in the proportion of traffic deaths affected by the various standards are discussed. Appended are an analysis of highway use trends, population projections for persons and vehicles, an analysis of delta V (change in velocity), taxonomies of fatalities in 1977, and summaries of side impact and truck rear underride information.

by Hans C. Joksch; Joseph C. Reidy, Jr.
Center for the Environment and Man, Inc., 275 Windsor St., Hartford, Conn. 06120
DOT-HS-8-02000
1980 ; 139p refs
Rept. for Aug 1978-Dec 1979.
Availability: NTIS

HS-805 322

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY

by G. J. Fabian, ed.
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-7-01551
Rept. No. ZN-6069-V-32-1 ; 1980 ; 60p 27refs
Rept. for 26 Jan 1977-31 Jan 1980. For abstract, see HS-805 323. See also HS-805 301 and HS-805 302.
Availability: NTIS

HS-805 323

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION

Using a combination of mathematical modeling on the computer with static and dynamic testing, design issues that remained at the completion of Phase 2 were resolved, validation tests were conducted to demonstrate performance resulting from these design improvements, and the results incorporated in the final design. Additional investigations defined emissions and fuel economy, documented the degree of research safety vehicle (RSV) compliance with current Federal Motor Vehicle Standards, and studied the effect of the RSV design on collision repair, producibility, and cost. Ten vehicles were built to this final design. Tests conducted on prototypes and tests by others on the ten Phase 4 vehicles indicate successful achievement of the RSV goals. The results of developmental testing during Phase 3 are summarized as well as information from tests so far completed in Phase 4. Specific significant results include demonstration of survival of RSV occupants: in head-on collisions with both cars traveling at 40 mph (80 mph relative car-to-car speed); when struck on the side at 40 mph; and when hit from the rear at 45 mph. In addition, 50th percentile dummy pedestrians exhibited reduced injury levels from primary impacts at speeds up to 25 mph. Handling and braking exceeded the design specifications. Fuel economy was shown to be in the range of the 1985 requirements and emissions were shown to meet the 1978 California standard. Design of the vehicle is consistent with mass production techniques. Also, materials used in fabrication were chosen to minimize energy content, rare mineral requirements, and facilitate recycling for reuse. The results of the RSV tests in the U.S. and abroad prove the practicability of the design and substantiate its applicability to current production vehicles.

by G. J. Fabian, ed.
Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-7-01551
Rept. No. ZN-6069-V-32-2 ; 1980 ; 124p 61refs
Rept. for 26 Jan 1977-31 Jan 1980. For summary report, see HS-805 322. See also HS-805 301 and HS-805 302.
Availability: NTIS

HS-805 325

STUDY OF METHODS FOR INCREASING SAFETY BELT USE. STUDY REPORT

The recommendations and suggestions are summarized of a special committee convened to assess methods that have been or could be used to induce people to wear safety belts. The study included a comprehensive review of earlier evaluations of programs designed to promote seat belt use, and of consultations with public agencies, industry, private-sector organizations, and individuals. The committee concluded that no single program is likely to prove effective. Six key strategies were developed for Federal action: incentives to the states to enact child- and youth-occupant protection laws; compulsory seat belt use by on-the-job Federal employees; more productive use of Federal financial assistance for safety belt programs; identification of and publicity about the economic cost of not wearing seat belts; Federal testing of on-the-job safety belt use programs for industry, with possible insurance rate benefits; and involvement of Federal health agencies in safety belt programs. Methods for influencing safety belt behavior were identified as prescription (laws, regulations, and judicial decisions), economic incentives (insurance), changes in perception (by schools, health care centers, and the media), and personal and community influences (e.g. health care professionals).

Transportation Res. Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. UR-17 ; 1980 ; 12p 26refs
Sponsored by the National Hwy. Traffic Safety Administration.
Availability: NHTSA

HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

The handling and braking performance requirements for passenger cars towing trailers are based on the results of over 2000 combination-vehicle tests with eight trailers and three rear wheel drive tow cars (in 95 different configurations), over 500 tests with three trailers and two front wheel drive tow cars (in 38 different configurations), plus the results of previous trailer towing research. The proposed standards include recommendations for straight line braking performance, trailer swing stability, tow car steady turn stability, and combined brake in turn stability and performance. For straight line braking, the recommended performance criterion is 0.4 g deceleration of the combination-vehicle. A tow car weight based on trailer brake capability requirement is specified to meet this deceleration requirement. For trailer swing stability the safety-related performance measure is damping ratio. A minimum damping ratio of 0.15 (or 3/4 cycles to one-half amplitude) has been recommended. Test procedures and analysis are presented which can be used to determine damping ratio for each trailer. In this case, a minimum hitch load criterion based on tow car weight is suggested to insure performance compliance. For tow car stability a tentative performance criterion of maintaining a positive tow car understeer gradient up to and including 0.3 g cornering has been recommended. This requirement sets a limit on the maximum allowable hitch load for a given tow car weight and is a function of the load leveling torque applied by a weight equalizing (Class 3) hitch. These latter two handling requirements have been integrated into a single hitch load versus tow car weight graph unique to each trailer. Use of this graph by a user or manufacturer will define the proper hitch load range for a given tow car size and/or help specify the minimum weight tow car for a given trailer. A list of user guidelines is provided.

by Richard H. Klein; Henry T. Szostak
Systems Technology, Inc., 13766 South Hawthorne Blvd.,
Hawthorne, Calif. 90250
DOT-HS-7-01720
Rept. No. STI-TR-1114-1-Vol-1 ; 1979 ; 38p 9refs
Rept. for Sep 1977-Nov 1979. Vols. 2-4 are HS-805 327--HS-805 329.
Availability: NTIS

HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT

Suitable handling and braking performance requirements for rear-wheel drive passenger cars towing trailers are identified. This includes straight line braking, trailer swing stability, tow car steady turn stability, and combined brake-in-turn stability. Over 2000 combination-vehicle tests with eight trailers and three tow cars (in over 250 different configurations), plus the results of previous trailer towing research were then used to validate and/or revise the criteria and procedures. For straight line braking performance a combination-vehicle deceleration criterion of 0.4 g is recommended. A tow car weight requirement based on trailer brake capability is specified to meet the deceleration requirement. For trailer swing stability, a minimum damping ratio of 0.15 (or 3/4 cycles to 1/2 amplitude) is recommended. Test procedures and analysis curves are presented which can be used to determine damping ratios for each trailer. In this case a minimum hitch load criterion based on tow car weight is suggested to insure performance compliance. For tow car stability a tentative performance criterion of maintaining a positive tow car understeer up to and including 0.3 g cornering is recommended. This requirement sets a limit on the maximum allowable hitch load for a given weight tow car, and is a function of load leveling torque applied by a weight distributing hitch. These latter two handling requirements have been integrated into a hitch load versus tow car weight graph unique to each trailer. Use of this graph by a user or manufacturer wil define the proper hitch load range for a given tow car size and/ or help specify the minimum weight tow car for a given trailer

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Systems Technology, Inc., 13766 South Hawthorne Blvd.,
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DOT-HS-7-01720
Rept. No. STI-TR-1114-1-Vol-2 ; 1979 ; 149p 30refs
Rept. for Sep 1977-Nov 1979. Vol. 1 is HS-805 326; Vol. 3 is HS-805 328; Vol. 4 is HS-805 329.
Availability: NTIS

HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT

All relevant specifications, measured parameter values, and ve hicle equipment descriptions are provided for the three tov vehicles and eight trailers used in the initial test program. Th tow vehicles and trailer specifications include loading recom mendations in the U-Haul trailer; tandem axle roll steer effect and their effect on the tow car stability factor; and the design o a horse trailer tandem axle. The full-scale instrumentation, tes equipment and test procedures are described, and a run lo summary provided. Straight line brake equations and test dat are presented, as well as trailer damping ratio and tow ca stability factor data.

by Richard H. Klein; Henry T. Szostak
Systems Technology, Inc., 13766 South Hawthorne Blvd.,
Hawthorne, Calif. 90250
DOT-HS-7-01720
Rept. No. STI-TR-1114-1-Vol-3 ; 1979 ; 124p 3refs
Rept. for Sep 1977-Nov 1979. Vol. 1 is HS-805 326; Vol. 2 is HS-805 327; Vol. 4 is HS-805 329.
Availability: NTIS

HS-805 329

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT

The handling and braking performance requirements are veri fied for passenger cars towing trailers. This includes straigh line braking, trailer swing stability, tow car steady turn stability and combined brake-in-turn stability. Over 500 combination vehicle tests with three trailers and two front wheel drive tov cars (in 34 different configurations), plus the results of previou trailer towing research, have been integrated into proposed per formance criteria, and a compliance format based on tow ca and trailer characteristics. For straight line braking perform ance, a combination-vehicle (CV) deceleration criteria of 0.4g i recommended. A tow car weight requirement based on traile brake capability is specified to meet this deceleration require ment. For unbraked trailers the tow car gross weight ratin should never be less than 1.5 times the trailer weight. For traile swing stability, a minimum damping ratio of 0.15 (or 3/4 cycle to 1/2 amplitude) is recommended. Test procedures and analysi curves are presented which can be used to determine dampin ratio for each trailer. In this case, a minimum hitch load crite rion based on tow car weight is suggested to insure performanc compliance. For tow car stability a tentative performance crite rion of maintaining a positive tow car understeer gradient up t and including 0.3g cornering is recommended. This requiremen sets a limit on the maximum allowable hitch load for a give weight tow car, and is a function of load leveling torque applied by a weight distributing hitch. The latter two handling requirements have been integrated into a hitch load versus tow car weight graph unique to each trailer. Use of this graph by a user or manufacturer will define the proper hitch load range for a given tow car size and/or help specify the minimum weight tow car for a given trailer.

by Richard H. Klein; Henry T. Szostak
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
DOT-HS-7-01720
Rept. No. STI-TR-1114-1-Vol-4 ; 1979 ; 108p 3refs
Rept. for Sep 1977-Nov 1979. Vols. 1-3 are HS-805 326--HS-805 328.
Availability: NTIS

HS-805 330

ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

Moped response, performance, and accident avoidance capabilities are assessed. Moped design features are reviewed. Four instrumented vehicles were evaluated. Full scale tests included: steady turn, lane change, free control stability, roadway disturbance, open and closed loop braking, acceleration/top speed, and hill climb. Two wheeler test procedures and measures are presented, along with subjective evaluations. Sensitivity to operating variables are quantified. Potential safety-related handling problems were identified. A typical moped was modified for increased speed performance, and upgraded brake and tire components.

by John W. Zellner; David H. Weir
Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, Calif. 90250
DOT-HS-7-01719
Rept. No. STI-TR-1113-1-I ; 1980 ; 35p 8refs
Rept. for Oct 1977-Feb 1980. Vol. 2 is HS-805 331.
Availability: NTIS

HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

An overview is provided of methodologies, results, and policy implications from an assessment of consumer behavior towards fuel-efficient vehicles designed to meet recently mandated Federal fuel economy standards. The study involves a comprehensive evaluation of existing nationwide survey data as well as the development of a major new econometric forecasting model of household vehicle type choice. The report includes both an assessment of consumers' current reported sentiments toward fuel-efficient vehicles and insights into expected future changes in household vehicle purchase behavior in response to changes in vehicle designs and prices, demographics, and the energy environment. Two forecasts of vehicle purchasing patterns through 1985 are developed based on an assumed schedule of vehicle design changes and alternative fuel price scenarios.

by Leonard Sherman; Charles F. Manski; J. Royce Ginn
Cambridge Systematics, Inc., 238 Main St., Cambridge, Mass. 02142
DOT-HS-7-01780
1980 ; 40p
Rept. for Oct 1977-Feb 1980. Vols. 2-3 are HS-805 340--HS-805 341.
Availability: NTIS

HS-805 340

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT

To meet the National Highway Traffic Safety Administration's (NHTSA) need to forecast consumer response to fuel-efficient motor vehicle designs, a statistical analysis was performed on a longitudinal series of Surveys of Consumer Sentiment, administered by the University of Michigan's Survey Research Center. A broad set of questions was examined concerning consumer attitudes towards energy policy in general and motor vehicle-related conservation efforts in particular. The survey analysis indicated a widespread awareness of the need to consume less in response to dwindling fossil fuel supplies, but pointed to a far smaller number of households willing to reduce their private gasoline consumption voluntarily either through changes in vehicle holdings or vehicle utilization. This discrepancy between public responsibility and private action underscores the importance of NHTSA'S Corporate Average Fuel Economy (CAFE) program. In terms of consumer reactions to vehicle design changes under the Title V mandate, the prevailing sentiment was that more fuel efficient vehicles could and would be introduced by domestic manufacturers. A significant majority of consumers favored sacrificing vehicle performance (i.e., engine size/power) rather than vehicle size as a means of meeting CAFE standards. The proportion of respondents favoring a downsized version of present models declines from 51% for full-size autos to only 17% for compacts. This has ominous implications for consumer acceptance of successively downsized automobiles. The survey results indicated that recent sales gains of light duty trucks are largely attributable to relatively young, well-educated white and blue-collar workers who used trucks as a substitute for auto transportation.

by Leonard Sherman; J. Royce Ginn; Daniel H. Hill; Martha S. Hill
Cambridge Systematics, Inc., 238 Main St., Cambridge, Mass. 02142
DOT-HS-7-01780
1980 ; 203p
Rept. for Sep 1977-Feb 1980. Vol 1, is HS-805 339; Vol. 3 is HS-805 341.
Availability: NTIS

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INDEX to ABSTRACTS

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KWOC Title Index

ABRIDGEMENT

COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

ABSORBER

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

ABSORBERS

HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS
HS-026 589

ABSORBING

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

ACCELEROMETER

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

ACCESSIBILITY

ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

ACCURACY

ALCOHOL AND SPEED-ACCURACY TRADEOFF
HS-026 714

ADHESION

FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

ADIRONDACK

EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

ADJUDICATION

ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES
HS-026 671

ADMINISTRATIVE

ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES
HS-026 671

ADVANCE

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

ADVISORY

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

AFFECT

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?
HS-026 570

AFRAID

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB
HS-026 572

AFTERMATH

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

AGE

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

AGGRESSIVENESS

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

AIDS

EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

AIR

AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

ALCOHOL

ALCOHOL AND SPEED-ACCURACY TRADEOFF
HS-026 714

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

ECONOMIC ANALYSIS OF ALCOHOL SAFETY COUNTERMEASURES
HS-026 670

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

ALCOHOLISM

EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

ALPHA

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

ALTERNATIVES

ALTERNATIVES ANALYSIS FOR ARTERIAL STREETS
HS-026 578

ALUMINUM

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

AMBULANCE

AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT
HS-805 128

ANGLE

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

ANTHROPOMETRIC

ANTHROPOMETRIC SOURCE BOOK. VOL. 1: ANTHROPOMETRY FOR DESIGNERS
HS-026 741

ANTHROPOMETRIC SOURCE BOOK. VOL. 2: A HANDBOOK OF ANTHROPOMETRIC DATA
HS-026 742

ANTHROPOMETRIC SOURCE BOOK. VOL. 3: ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY
HS-026 743

ANTHROPOMETRY

ANTHROPOMETRIC SOURCE BOOK. VOL. 1: ANTHROPOMETRY FOR DESIGNERS
HS-026 741

ANTHROPOMETRIC SOURCE BOOK. VOL. 3: ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY
HS-026 743

THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

ANTILOCK

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

ANWENDUNG

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

APPLIED

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

APPLYING

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

APPRAISE

ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

APPURTENANCES

ROADSIDE SAFETY APPURTENANCES
HS-026 745

ARIZONA

ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

ARMY

THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

ART

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE
HS-026 697

ARTERIAL

ALTERNATIVES ANALYSIS FOR ARTERIAL STREETS
HS-026 578

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

ASSESSMENT

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

ASSISTANCE

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

ASSOCIATED

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

ASSOCIATION

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

ATTRACTION

AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
HS-026 648

AUFPRALLDAMPFER

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

AUSTRIA

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

AUTO

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT
HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

AUTOMATED

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

AUTOMATIC

AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

AUTOMOBILE

AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
HS-026 648

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

THE AUTOMOBILE AND THE ENVIRONMENT: AN INTERNATIONAL PERSPECTIVE
HS-026 706

THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTER-

ISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

12-VOLT AUTOMOBILE VACUUM CLEANERS
HS-026 782

AUTOMOBILES

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES
HS-026 711

TRANSIENT CONTROL RESPONSE OF AUTOMOBILES
HS-026 634

AUTOMOTIVE

AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979
HS-026 586

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977
HS-026 581

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

PLANNING FOR AUTOMOTIVE ELECTRONIC INSTRUMENTATION
HS-026 665

REVIEW OF THE AUTOMOTIVE TORQUE CONVERTER
HS-026 661

THE AUTOMOTIVE POPULATION EXPLOSION
HS-026 574

AVAILABILITY

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

AVOIDANCE

ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 330

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

AWARENESS

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

AXLED

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

AXLES

NEW 7.5- AND 8.5-INCH FORD AXLES FOR 1979
HS-026 663

BACK

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

BAG

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

BAGS

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

BALANCING

A BRIGHT FUTURE FOR WHEEL BALANCING
HS-026 779

BARREL

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

BARRIER

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

EVALUATION OF DELINEATION SYSTEMS FOR THE NEW JERSEY BARRIER
HS-026 685

BASE
EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

BASELINE
BASELINE TESTS OF THE ELECTRA-VAN MULTI-PURPOSE ELECTRIC VAN
HS-026 740

BASES
DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

BASICS
MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

BEGINS
IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

BEHAVIOR
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT
HS-804 775

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING
HS-026 713

BEHAVIOUR
A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR
HS-026 645

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

BELT
STUDY OF METHODS FOR INCREASING SAFETY BELT USE. STUDY REPORT
HS-805 325

BELTED
COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

BIBLIOGRAPHY
ANTHROPOMETRIC SOURCE BOOK. VOL. 3: ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY
HS-026 743

BICYCLE
EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]
HS-026 733

BICYCLING
NORTH CAROLINA'S BICYCLING HIGHWAYS
HS-026 736

BIKEWAY
EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

BOARD
COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

BODY
HOW TO BUY A BODY FOR A UTILITY TRUCK
HS-026 771

BOLTED
EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

BOOK
ANTHROPOMETRIC SOURCE BOOK. VOL. 1: ANTHROPOMETRY FOR DESIGNERS
HS-026 741

ANTHROPOMETRIC SOURCE BOOK. VOL. 2: A HANDBOOK OF ANTHROPOMETRIC DATA
HS-026 742

ANTHROPOMETRIC SOURCE BOOK. VOL. 3: ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY
HS-026 743

EARLYRIDER FACT BOOK [CHILD RESTRAINTS]
HS-805 057

BOOST
TWO WAYS TO BOOST A LIGHT DUTY DIESEL
HS-026 637

BOUNCING
PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

BOUNDARY
VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

BOWL
TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

BRAKE
TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

BRAKING
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

BRASS
FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

BREAKAWAY
BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)
HS-026 756

DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

BREMSSCHEIBEN
TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

BRIGHT
A BRIGHT FUTURE FOR WHEEL BALANCING
HS-026 779

BRINGING
BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS
HS-026 762

BRITAIN
ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

BROWN
EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

BULLETPROOF
BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS
HS-026 762

BUMPERS
DUAL PHASE STEEL PRODUCTION BUMPERS
HS-026 719

PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

BUS
TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

CALCULATION
TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

CALENDAR
TRAFFIC ANALYSIS ANNUAL REPORT, CALENDAR YEAR 1978 [DISTRICT OF COLUMBIA]
HS-026 569

CALIFORNIA
CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT
HS-026 739

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)
HS-026 694

CALLS

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

CALSPAN

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY
HS-805 322

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION
HS-805 323

CAMPAIGNS

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

CAPABILITIES

ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 330

CAR

CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

CAROLINA

NORTH CAROLINA'S BICYCLING HIGHWAYS
HS-026 736

CARRYING

DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS
HS-026 653

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

CARS

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS
HS-026 762

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

CASE

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL--A CASE FOR HELMET USE
HS-805 312

CATALYTIC

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

CAUSATION

MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

CENTERS

CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)
HS-026 730

CHALLENGE

FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT--A NEW CHALLENGE
HS-026 722

CHANNEL

EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

CHARACTERISTICS

CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977
HS-026 581

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES
HS-026 641

SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]
HS-026 733

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

CHECK

HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS
HS-026 589

CHILD

EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

EARLYRIDER FACT BOOK [CHILD RESTRAINTS]
HS-805 057

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

EARLYRIDER PUBLICITY HANDBOOK [CHILD RESTRAINTS]
HS-805 059

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

CHOICE

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT
HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

CHORD

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

CHRYSLER

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY
HS-805 322

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION
HS-805 323

WEIGHT STUDY: 1978 CHRYSLER OMNI. FINAL REPORT
HS-804 720

CITIES

AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES
HS-026 711

CITY

CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)
HS-026 730

CLASS

DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE
HS-026 587

CLEANERS

12-VOLT AUTOMOBILE VACUUM CLEANERS
HS-026 782

CODING

INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

COLD

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

COLLISION

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

COLLISIONS

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

COLUMBIA

TRAFFIC ANALYSIS ANNUAL REPORT, CALENDAR YEAR 1978 [DISTRICT OF COLUMBIA]
HS-026 569

COMBUSTION

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

COMMERCIAL

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

COMMITTEE

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

COMMUNICATIONS

LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

COMMUNITIES

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

COMMUNITY

EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL
HS-026 576

COMPARISON

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

COMPATIBILITIES

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

COMPATIBILITY

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

COMPLEXITY

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

COMPREHENSIVE

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

COMPTROLLER

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

COMPUTER

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

COMPUTERIZED

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

COMPUTERIZED FACILITY FOR ENGINE DEVELOPMENT
HS-026 769

COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

COMPUTING

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

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CONCEPT

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

CONGRESS

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL--A CASE FOR HELMET USE
HS-805 312

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

CONSERVATION

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT
HS-805 205

EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL
HS-026 576

CONSISTENCY

HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY
HS-026 699

CONSOLIDATED

CONSOLIDATED TRANSPORTATION PROGRAM (1978-1982), MARYLAND
HS-026 703

CONSTRUCTION

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

CONTACT

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

CONTROL

AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW
HS-026 593

THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

TRAFFIC CONTROL DEVICES, VISIBILITY, AND GEOMETRICS
HS-026 684

TRANSIENT CONTROL RESPONSE OF AUTOMOBILES
HS-026 634

CONTROLLABILITY

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

CONTROLLERS

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

CONTROVERSY

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

CONVERTER

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

REVIEW OF THE AUTOMOTIVE TORQUE CONVERTER
HS-026 661

COOLED

EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

COPS

MOTOR COPS
HS-026 776

CORDS

FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

CORRELATES

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

CORRELATION

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

COST

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

COUNTERMEASURES

ECONOMIC ANALYSIS OF ALCOHOL SAFETY COUNTERMEASURES
HS-026 670

COUNTRIES
AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES
HS-026 711

COUNTY
1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]
HS-026 667

COUPLING
DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

CRANKCASE
AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

CRASH
CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

CREATION
CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)
HS-026 730

CREEP
VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

CRITERIA
EMISSION FACILITY DESIGN CRITERIA
HS-026 723

CRUDE
MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

CRUSHABLE
PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

CRY
IT'S TIME TO "CRY HAVOC"
HS-026 780

CUES
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

CURRICULUM
EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

CUSHION
CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

CYCLE
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT--A NEW CHALLENGE
HS-026 722

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

CYCLIST
CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

DAYTIME
EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

DEATH
DEATH AND INJURY ROAD ACCIDENTS IN NORTHERN IRELAND 1978
HS-026 680

DEFECT
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

DELINEATION

EVALUATION OF DELINEATION SYSTEMS FOR THE NEW JERSEY BARRIER
HS-026 685

DEMONSTRATION

COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

DEPARTMENT

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

DEPRIVATION

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

DESCRIBE

MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

DESCRIBING

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

DESIGN

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

EMISSION FACILITY DESIGN CRITERIA
HS-026 723

HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY
HS-026 699

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

DESIGNERS

ANTHROPOMETRIC SOURCE BOOK. VOL. 1: ANTHROPOMETRY FOR DESIGNERS
HS-026 741

DETECTION

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

DETECTOR

THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

DEVELOPING

AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES
HS-026 711

DEVICE

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

DEVICES

PERFORMANCE OF HIGHWAY SAFETY DEVICES
HS-026 746

TRAFFIC CONTROL DEVICES, VISIBILITY, AND GEOMETRICS
HS-026 684

DEW

PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)
HS-026 689

DIABETIC

DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE
HS-026 587

DIESEL

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

TWO WAYS TO BOOST A LIGHT DUTY DIESEL
HS-026 657

DIGEST

TRAFFIC SAFETY '78. A DIGEST OF ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
HS-805 100

DIMENSIONAL

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

DIRECT

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

DIRECTIONAL

ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES
HS-026 641

DISABLED

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

DISKS

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

DISPLACEMENT

MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

DISPLAYS

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

DISPOSAL

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

DISTRICT

TRAFFIC ANALYSIS ANNUAL REPORT, CALENDAR YEAR 1978 [DISTRICT OF COLUMBIA]
HS-026 569

DIVERSION

REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)
HS-026 728

DIY

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB
HS-026 572

DOMAINS

AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
HS-026 648

DOUBLE

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

DRINKING

EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

DRIVE

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

DRIVER

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING
HS-026 713

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

PHYSICIAN REPORTING OF THE IMPAIRED DRIVER
HS-026 781

REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)
HS-026 694

THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

DRIVERS

ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 777

EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

DRIVING

ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES
HS-026 671

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING
HS-026 713

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

DRUNKEN

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

DUAL

DUAL PHASE STEEL PRODUCTION BUMPERS
HS-026 719

DUTY

TWO WAYS TO BOOST A LIGHT DUTY DIESEL
HS-026 657

DYNAMIC

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

DYNAMICAL

DYNAMICAL ANALYSIS OF SUSPENSION SYSTEMS
HS-026 632

DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS
HS-026 653

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

DYNAMICS

A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

EARLY

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

EARLYRIDER

EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

EARLYRIDER FACT BOOK [CHILD RESTRAINTS]
HS-805 057

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

EARLYRIDER PUBLICITY HANDBOOK [CHILD RESTRAINTS]
HS-805 059

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

ECONOMIC

ECONOMIC ANALYSIS OF ALCOHOL SAFETY COUNTERMEASURES
HS-026 670

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

ECONOMY

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT
HS-803 668

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY
HS-026 660

EDUCATION

CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT
HS-026 739

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760

MOTORCYCLE SAFETY EDUCATION AND LICENSING
HS-026 785

EDUCATIONAL

EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

EEG

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

EFFECTIVENESS

COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

EFFICIENCIES

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

EFFICIENCY

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

EFFICIENT

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT
HS-804 775

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

ELECTRA

BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN
HS-026 740

ELECTRIC

BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN
HS-026 740

ELECTRICAL

AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT
HS-805 128

ELECTROENCEPHALOGRAM

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

ELECTROMAGNETS

DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS
HS-026 653

ELECTRONIC

PLANNING FOR AUTOMOTIVE ELECTRONIC INSTRUMENTATION
HS-026 665

EMERGENCY

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

EMISSION

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

EMISSION FACILITY DESIGN CRITERIA
HS-026 723

EMISSIONS

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT
HS-803 668

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

ENERGY

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT
HS-805 205

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

ENFORCEMENT

ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

ENGINE

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

COMPUTERIZED FACILITY FOR ENGINE DEVELOPMENT
HS-026 769

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT–A NEW CHALLENGE
HS-026 722

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB
HS-026 572

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

ENGINEERING

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

ENGINES

EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

ENVIRONMENT

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

THE AUTOMOBILE AND THE ENVIRONMENT: AN INTERNATIONAL PERSPECTIVE
HS-026 706

THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

ENVIRONMENTAL

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

EQUATIONS

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

EQUIPMENT

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

ERGONOMIC

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

ESTABLISH

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

ESTABLISHED

EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

ESTIMATE

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

EVALUATION

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

EVALUATION OF DELINEATION SYSTEMS FOR THE NEW JERSEY BARRIER
HS-026 685

EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION–AN ASSESSMENT.

REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

EXCITED

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

EXECUTIVE

ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 330

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY
HS-805 322

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT
HS-804 775

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

EXPERIENCED

EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

EXPERIMENT

AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

EXPERIMENTAL

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

EXPLOSION

THE AUTOMOTIVE POPULATION EXPLOSION
HS-026 574

EXTENDED

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

FACILITIES

SIGNING WARRANTS FOR NONSERVICE FACILITIES (ABRIDGMENT)
HS-026 688

FACILITY

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

COMPUTERIZED FACILITY FOR ENGINE DEVELOPMENT
HS-026 769

EMISSION FACILITY DESIGN CRITERIA
HS-026 723

FARS

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

FATAL

STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

FEASIBILITY

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

FEATHERFOOT

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

FEDERAL

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT

HS-805 164

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT

HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT

HS-805 163

FESTSTOFF

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)

HS-026 705

FIELD

RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION

HS-026 725

FIGHTS

DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE

HS-026 587

FILTERS

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES

HS-026 773

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS

HS-026 772

FINLAND

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978

HS-026 778

FIXING

LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES

HS-026 763

FLEETS

CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977

HS-026 581

FLOW

SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS

HS-026 591

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE

HS-026 659

FLYWHEEL

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES

HS-026 664

FOLLOWER

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL

HS-026 639

FORCE

CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT

HS-026 739

FORCES

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY

HS-026 654

FORD

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS

HS-026 762

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT

HS-805 169

NEW 7.5- AND 8.5-INCH FORD AXLES FOR 1979

HS-026 663

FORECASTING

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT

HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT

HS-026 759

FOREIGN

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979

HS-805 265

FRAME

HOW TO BUY A TRUCK FRAME FOR A UTILITY VEHICLE

HS-026 770

FREE

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT

HS-026 704

FREEWAY

REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)

HS-026 728

FREQUENCIES

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS

HS-026 595

FRESH
MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

FRONT
DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

FRONT WHEEL VIBRATIONS
HS-026 630

FROST
PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)
HS-026 689

FUEL
AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT
HS-803 668

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT
HS-804 775

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING
HS-026 713

EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL
HS-026 576

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?
HS-026 570

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY
HS-026 660

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

FUNDAMENTAL
FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

GAS
COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

GASOLINE
COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

GASOLINES
MOTOR GASOLINES, WINTER 1978-79
HS-026 774

GEOMETRICS
TRAFFIC CONTROL DEVICES, VISIBILITY, AND GEOMETRICS
HS-026 684

GLASGOW
SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW
HS-026 593

GOODS
ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

GOVERNMENT
AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979
HS-026 586

GUARDRAIL
COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

GUIDE

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

GUIDE TO THE MOTOR INDUSTRY OF JAPAN 1979
HS-026 580

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE
HS-026 697

GUIDEWAY

A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

HALO

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

HANDBOOK

ANTHROPOMETRIC SOURCE BOOK. VOL. 2: A HANDBOOK OF ANTHROPOMETRIC DATA
HS-026 742

EARLYRIDER PUBLICITY HANDBOOK [CHILD RESTRAINTS]
HS-805 059

HANDICAPPED

ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 777

HANDLING

COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

HAVOC

IT'S TIME TO "CRY HAVOC"
HS-026 780

HAZARD

ROADSIDE HAZARD MODEL (ABRIDGMENT)
HS-026 695

HAZARDS

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

HEALTH

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

HEARING

AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979
HS-026 586

HEAVY

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

IMPROVING ANTI-ROLL PROPERTIES OF SEMITRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES
HS-026 641

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

HEIGHT

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

HELD

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

HELMET

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL--A CASE FOR HELMET USE
HS-805 312

HIGHWAY

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY
HS-026 699

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

PERFORMANCE OF HIGHWAY SAFETY DEVICES
HS-026 746

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

TRAFFIC SAFETY '78. A DIGEST OF ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
HS-805 100

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]
HS-026 667

HIGHWAYS

ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

NORTH CAROLINA'S BICYCLING HIGHWAYS
HS-026 736

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

HISTORIES

THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES
HS-026 649

HONEYWELL

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

HOUSE

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

HUMAN

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

HUMPS

SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW
HS-026 593

ICE

THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

IDENTIFICATION

IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME-HISTORIES
HS-026 649

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

IHRE

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

IMPACT

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHI-

CLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

IMPAIRED

PHYSICIAN REPORTING OF THE IMPAIRED DRIVER
HS-026 781

IMPLEMENTATION

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE
HS-026 697

IMPLICATIONS

AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

IMPROVING

IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

INCH

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS
HS-026 762

NEW 7.5- AND 8.5-INCH FORD AXLES FOR 1979
HS-026 663

INCIDENCE

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

INCREASE

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

INCREASED

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

INCREASING

STUDY OF METHODS FOR INCREASING SAFETY BELT USE. STUDY REPORT
HS-805 325

INDIRECT

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

INDUSTRY

AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979
HS-026 586

GUIDE TO THE MOTOR INDUSTRY OF JAPAN 1979
HS-026 580

INFANT

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

INFORMATION

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

INJECTION

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

INJURY

DEATH AND INJURY ROAD ACCIDENTS IN NORTHERN IRELAND 1978
HS-026 680

INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

INNOVATIONS

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

INPUT

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

INSPECTION

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

DETERMINATION OF TIRE QUALITY FROM NONDESTRUCTIVE INSPECTION. FINAL REPORT
HS-804 828

INSTRUMENTATION

PLANNING FOR AUTOMOTIVE ELECTRONIC INSTRUMENTATION
HS-026 665

WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT
HS-026 682

INTENSITY

RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

INTERACTION

A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

INTERIM

MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

INTERNATIONAL

THE AUTOMOBILE AND THE ENVIRONMENT: AN INTERNATIONAL PERSPECTIVE
HS-026 706

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

INTERSECTIONS

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

SIGNALIZATION OF HIGH-SPEED, ISOLATED INTERSECTIONS
HS-026 692

INTOXICATED

ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES
HS-026 671

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

INVENTORY

COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

INVESTIGATION

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

IRELAND

DEATH AND INJURY ROAD ACCIDENTS IN NORTHERN IRELAND 1978
HS-026 680

ISOLATED

CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

SIGNALIZATION OF HIGH-SPEED, ISOLATED INTERSECTIONS
HS-026 692

ISRAEL

SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]
HS-026 733

IUTAM

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

JAPAN

GUIDE TO THE MOTOR INDUSTRY OF JAPAN 1979

HS-026 580

MOTOR VEHICLE STATISTICS OF JAPAN 1979

HS-026 579

JAPANESE

EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES

HS-026 720

JERSEY

EVALUATION OF DELINEATION SYSTEMS FOR THE NEW JERSEY BARRIER

HS-026 685

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]

HS-026 667

JOB

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB

HS-026 572

JUMP

PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP

HS-026 729

KENSINGTON

SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW

HS-026 593

KILOWATT

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT

HS-026 704

KINDS

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM

HS-026 655

KINEMATICS

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)

HS-026 749

KM

ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)

HS-026 673

LAMP

LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)

HS-026 727

LAND

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT

HS-805 205

LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES

HS-026 763

LANE

EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM

HS-026 735

MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS

HS-026 696

LANES

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE

HS-026 697

LATE

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978

HS-026 778

LATERAL

MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)

HS-026 701

LAW

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL--A CASE FOR HELMET USE

HS-805 312

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)

HS-026 681

LAWS

LAWS FOR LAWS' SAKE? [VEHICLE RECALLS]

HS-026 775

LEAN

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS

HS-026 721

LEFT

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE

HS-026 697

LEGIBILITY

LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)

HS-026 727

LENGTH

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT

HS-803 668

LEVEL

EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL

HS-026 576

LICENSE

DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE

HS-026 587

LICENSING
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760
MOTORCYCLE SAFETY EDUCATION AND LICENSING
HS-026 785

LIGHT
DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753
INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715
STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162
STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163
TWO WAYS TO BOOST A LIGHT DUTY DIESEL
HS-026 657

LIGHTING
RELATION BETWEEN LIGHTING PARAMETERS AND TRANSPORTATION PERFORMANCE
HS-026 693

LIMIT
ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673
ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

LIMITATION
METHODS OF TRAFFIC LIMITATION IN URBAN AREAS
HS-026 709

LIMITS
IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

LIQUID
THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

LOAD
THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

LOAN
EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

LONG
IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

LOOKING
MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

LOW
COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

LUBE
AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773
DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

LUBRICANTS
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720
PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

LUMINAIRES
DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

LUMINANCE
RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

MACROSCOPIC
MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS
HS-026 696

MAINTENANCE
REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)
HS-026 728

MAKERS
THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

MALLEABLE

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

MANUAL

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

MANUFACTURERS

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

MANUFACTURING

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

MARYLAND

CONSOLIDATED TRANSPORTATION PROGRAM (1978-1982), MARYLAND
HS-026 703

MASTER

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

MATCHING

POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY
HS-026 660

MATERIALS

RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

MATHEMATICAL

MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

MATRIX

LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)
HS-026 727

MAXIMUM

ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

MEASURED

THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES
HS-026 649

MEASUREMENTS

COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

MEASURES

ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

MEASURING

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

MECHANICS

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

MEDIAN

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

MEN

THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

MENASCO

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

MESSAGES

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

METHODOLOGY

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

METHODS

METHODS OF TRAFFIC LIMITATION IN URBAN AREAS
HS-026 709

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

STUDY OF METHODS FOR INCREASING SAFETY BELT USE. STUDY REPORT
HS-805 325

THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES
HS-026 649

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

METRICATION

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

METROPOLITAN

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT
HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

MICHIGAN

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

MICROPROCESSORS

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

MICROWAVE

THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

MILEAGE

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]
HS-026 667

MILES

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

MOBILE

LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

MOBILITY

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

MODE

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT
HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

MODEL

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW
HS-026 732

ROADSIDE HAZARD MODEL (ABRIDGMENT)
HS-026 695

MODELING

MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS
HS-026 696

MODELS

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

MODES

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

MODIFICATIONS

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

MOPEDS

ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 330

MOTION

WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT
HS-026 682

MOTOR

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT
HS-805 321

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT
HS-805 205

EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL
HS-026 576

GUIDE TO THE MOTOR INDUSTRY OF JAPAN 1979
HS-026 580

MOTOR COPS
HS-026 776

MOTOR GASOLINES, WINTER 1978-79
HS-026 774

MOTOR VEHICLE STATISTICS OF JAPAN 1979
HS-026 579

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

MOTORCYCLE

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL--A CASE FOR HELMET USE
HS-805 312

MOTORCYCLE SAFETY EDUCATION AND LICENSING
HS-026 785

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

MOTORCYCLISTS

EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

MOTORIST

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

MOVEMENT

PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP
HS-026 729

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

MOVING

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

MPH

ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

MULTILEVEL

MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

MULTIPURPOSE

BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN
HS-026 740

MUNICIPALITY

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]
HS-026 667

MVMA

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

NATIONAL

ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

TRAFFIC SAFETY '78. A DIGEST OF ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
HS-805 100

NHTSA

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

NIGHT

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

NOISE

AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

NONDESTRUCTIVE

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

DETERMINATION OF TIRE QUALITY FROM NONDESTRUCTIVE INSPECTION. FINAL REPORT
HS-804 828

NONSERVICE

SIGNING WARRANTS FOR NONSERVICE FACILITIES (ABRIDGMENT)
HS-026 688

NONSIGNALIZED

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

NONSMOKERS

EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

NORTHERN

DEATH AND INJURY ROAD ACCIDENTS IN NORTHERN IRELAND 1978
HS-026 680

OBSERVATIONS

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

OBSTACLES

COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

OECD

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

OFFENSES

ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES
HS-026 671

OIL

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT--A NEW CHALLENGE

HS-026 722

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS

HS-026 721

OLDS

DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS

HS-026 760

OLYMPICS

PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP

HS-026 729

OMNI

WEIGHT STUDY: 1978 CHRYSLER OMNI. FINAL REPORT

HS-804 720

ONCE

IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL

HS-026 588

OPERATE

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM

HS-805 056

OPERATION

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]

HS-026 707

VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS

HS-026 766

OPERATIONAL

COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT

HS-026 683

OPERATIONS

REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)

HS-026 728

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY

HS-026 708

OPTIONS

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]

HS-026 707

ORGANISATION

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]

HS-026 707

ORGANIZATIONAL

COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT

HS-026 683

OVERDRIVE

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION

HS-026 662

OVERPASSES

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)

HS-026 731

OVERREACHING

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY

HS-026 654

OVERVIEW

MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW

HS-026 732

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE

HS-026 697

OWNERSHIP

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT

HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT

HS-026 759

PARK

EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)

HS-026 686

PASS

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS

HS-026 772

PASSENGER

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT

HS-805 029

DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS

HS-026 653

EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER

HS-805 060

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

PASSIVE
THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

PATROL
GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

PATTERNS
ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

PEDESTRIAN
COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)
HS-026 730

MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW
HS-026 732

PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP
HS-026 729

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

PENDULUM
PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

PERFORMANCE
ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS
HS-026 762

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

PERFORMANCE OF HIGHWAY SAFETY DEVICES
HS-026 746

PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)
HS-026 689

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

RELATION BETWEEN LIGHTING PARAMETERS AND TRANSPORTATION PERFORMANCE
HS-026 693

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

PERMIT
VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS
HS-026 766

PERSPECTIVE
THE AUTOMOBILE AND THE ENVIRONMENT: AN INTERNATIONAL PERSPECTIVE
HS-026 706

PHASES
NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

PHENOMENA
MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

PHOTOGRAPHY
TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

PHYSICIAN
PHYSICIAN REPORTING OF THE IMPAIRED DRIVER
HS-026 781

PITCHING
PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

PLANNING
MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

PLANNING FOR AUTOMOTIVE ELECTRONIC INSTRUMENTATION
HS-026 665

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

SURFACE TRANSPORT REGULATION AND RAILROAD PLANNING
HS-026 765

THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

PLATED
FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

POLE
ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

POLES
DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

POLICIES
EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL
HS-026 576

POLICY
AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

POLLUTION
AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

POOLING
CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

POPULATION
THE AUTOMOTIVE POPULATION EXPLOSION
HS-026 574

PORTABLE
EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

POSITION
LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

POST
COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

POSTS
PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

POWER
COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

POWERED
COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

POWERTRAIN
POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY
HS-026 660

PRACTICAL
TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

PRACTICES
ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

PREDICTION
PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

PRESIDENT
THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

PRIORITY
COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

PROBLEM
ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

PROBLEMS
ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL

AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

PROCEDURES
ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

PROCEEDINGS
THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

PROCESS
THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

PRODUCT
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

PRODUCTION
DUAL PHASE STEEL PRODUCTION BUMPERS
HS-026 719

PROFESSIONAL
EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

PROJECT
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

PROJECTING
STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

PROJECTS
COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

PROPERTIES
IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

PROPULSION
THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

PROTECTING
EARLYRIDER EDUCATIONAL CURRICULUM. THE HEALTH PROFESSIONAL'S ROLE IS PROTECTING THE CHILD PASSENGER
HS-805 060

PUBLIC
AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

PUBLICITY
EARLYRIDER PUBLICITY HANDBOOK [CHILD RESTRAINTS]
HS-805 059

PURPOSE
A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

QUALITITES
COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

QUALITY
DETERMINATION OF TIRE QUALITY FROM NONDESTRUCTIVE INSPECTION. FINAL REPORT
HS-804 828

RADAR
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

RADIO
ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

RADIOMETER
THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

RAIL
DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

RAILROAD

SURFACE TRANSPORT REGULATION AND RAILROAD PLANNING

HS-026 765

RANDOM

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT

HS-026 646

RANGE

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT

HS-026 575

RATE

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE

HS-026 656

RATED

RULES OF THE ROAD RATED [1979]

HS-805 119

RATES

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT

HS-026 737

RATIO

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS

HS-026 721

READERS

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY

HS-026 744

REANALYSIS

REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)

HS-026 694

REAR

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS

HS-026 762

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT

HS-805 327

REAREND

BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS

HS-026 762

RECALL

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979

HS-805 265

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT

HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT

HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT

HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT

HS-805 181

RECALLS

LAWS FOR LAWS' SAKE? [VEHICLE RECALLS]

HS-026 775

RECENT

RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY

HS-026 674

RECREATIONAL

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT

HS-805 205

REFLECTIVE

RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS

HS-026 690

REGULATION

SURFACE TRANSPORT REGULATION AND RAILROAD PLANNING

HS-026 765

REGULATIONS

VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS

HS-026 766

RELATIONSHIPS

SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS

HS-026 591

REPEAL

A REPORT TO THE CONGRESS ON THE EFFECT OF MOTORCYCLE HELMET USE LAW REPEAL--A CASE FOR HELMET USE

HS-805 312

REPLACE

HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS

HS-026 589

REPSONSE

ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES

HS-026 641

REQUIREMENTS

EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT

HS-805 321

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

RESEARCH

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY
HS-805 322

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION
HS-805 323

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

RESPECT

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

RESPOND

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

RESPONSE

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE
HS-026 644

TRANSIENT CONTROL RESPONSE OF AUTOMOBILES
HS-026 634

RESTRAINT

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

RESTRAINTS

EARLYRIDER FACT BOOK [CHILD RESTRAINTS]
HS-805 057

EARLYRIDER PUBLICITY HANDBOOK [CHILD RESTRAINTS]
HS-805 059

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

RESULTANT

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

RESULTS

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

RETREADED

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

REVIEW

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

REVIEW OF THE AUTOMOTIVE TORQUE CONVERTER
HS-026 661

REVOLUTION

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

RIDERS

EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

RIGHT

DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE
HS-026 587

RIGID

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

ROAD

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

DEATH AND INJURY ROAD ACCIDENTS IN NORTHERN IRELAND 1978
HS-026 680

EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE
HS-026 644

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

RULES OF THE ROAD RATED [1979]
HS-805 119

SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS
HS-026 591

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR
HS-026 645

ROADS

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

ROADSIDE

COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS
HS-026 696

RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

ROADSIDE HAZARD MODEL (ABRIDGMENT)
HS-026 695

ROADSIDE SAFETY APPURTENANCES
HS-026 745

STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

ROLES

AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979
HS-026 586

ROLL

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

ROUGHNESS

THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR
HS-026 645

ROUTE

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]
HS-026 667

RUBBER

FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

RULES

RULES OF THE ROAD RATED [1979]
HS-805 119

RUNNING

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

RURAL

MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS
HS-026 696

SAKE

LAWS FOR LAWS' SAKE? [VEHICLE RECALLS]
HS-026 775

SAMPLE

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

SAMPLING

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

SATELLITES

LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

SAVES

HONEYWELL SAVES GAS WITH FEATHERFOOT. DRIVING EFFICIENCY AWARENESS PROGRAM
HS-026 573

SCHEDULES

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

SEARCH

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

SEAT

EARLYRIDER LOAN A SEAT. HOW TO ESTABLISH AND OPERATE AN INFANT AND CHILD RESTRAINT LOAN PROGRAM
HS-805 056

SELECT

HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS
HS-026 589

SELECTION

COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

SELF

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

SEMI

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

SEMITRAILER

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

SEMITRAILERS

IMPROVING ANTI-ROLL PROPERTIES OF SEMITRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

SENTIMENTS

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

SERVICE

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

SHIFT

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

SHOCK

HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS
HS-026 589

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

SHOPPING

THE EARLYRIDER SHOPPING GUIDE TO INFANT/CHILD AUTOMOBILE RESTRAINTS
HS-805 176

SHORT

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

SHOWROOMS

IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

SICK

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB
HS-026 572

SIDE

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

SIGN

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)
HS-026 756

LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)
HS-026 727

PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

SIGNALIZATION

SIGNALIZATION OF HIGH-SPEED, ISOLATED INTERSECTIONS
HS-026 692

SIGNALIZED
CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

SIGNALS
INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

SIGNING
SIGNING WARRANTS FOR NONSERVICE FACILITIES (ABRIDGMENT)
HS-026 688

SIGNPOST
EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

SIGNS
EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)
HS-026 689

RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

SIMULATION
A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

SINGLE
COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

SITE
CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

SITES
STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

SIZE
VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS
HS-026 766

SKI
PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP
HS-026 729

SKIDDING
THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

SLIP
VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

SMALL
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY
HS-026 674

SMOKERS
EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

SMOKING
EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

SOCIAL
ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

SOIL
PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

SOLID
THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

SOURCE

ANTHROPOMETRIC SOURCE BOOK. VOL. 1: ANTHROPOMETRY FOR DESIGNERS
HS-026 741

ANTHROPOMETRIC SOURCE BOOK. VOL. 2: A HANDBOOK OF ANTHROPOMETRIC DATA
HS-026 742

ANTHROPOMETRIC SOURCE BOOK. VOL. 3: ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY
HS-026 743

SPARK

COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

SPECIFIC

RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

SPEED

ALCOHOL AND SPEED-ACCURACY TRADEOFF
HS-026 714

ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?
HS-026 570

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

SIGNALIZATION OF HIGH-SPEED, ISOLATED INTERSECTIONS
HS-026 692

SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW
HS-026 593

SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS
HS-026 591

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

SPEEDS

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

SPETEMBER

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

SPIN

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

SPURS

MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

SROD

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

STABILITY

AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
HS-026 648

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

STANDARD

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STANDARDS

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

STATES

CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977
HS-026 581

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

STATISTICAL

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

STATISTICS

MOTOR VEHICLE STATISTICS OF JAPAN 1979
HS-026 579

STATOR

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

STEADY

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

STEEL

DUAL PHASE STEEL PRODUCTION BUMPERS
HS-026 719

EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

STEERING

A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

STRAIGHT

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

STRATEGIES

AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES
HS-026 711

STREETS

ALTERNATIVES ANALYSIS FOR ARTERIAL STREETS
HS-026 578

CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)
HS-026 730

STRING

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

STROKE

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

STRUCTURE

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

SUPPORT

DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

SUPPORTS

PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

SURFACE

ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE
HS-026 644

SURFACE TRANSPORT REGULATION AND RAILROAD PLANNING
HS-026 765

SUSPA

THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

SUSPENSION

DYNAMICAL ANALYSIS OF SUSPENSION SYSTEMS
HS-026 632

SYMPOSIUM

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

SYSTEMATIC

HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY
HS-026 699

TAIL

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

TASK

CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT
HS-026 739

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

TAXICABS

COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

TECHNOLOGY

GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

TEMPERATURBERECHNUNGEN

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

TEMPERATURE

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT
HS-803 668

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

TEMPERATURES

AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

TEMPORARY

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

TERM

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

TEST

AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

TESTING

BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)
HS-026 756

DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

TESTS
BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN
HS-026 740
PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

THEORETICAL
A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590
THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629
THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631
THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

THEORY
AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

THERMODYNAMIC
THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

THINK
IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

TIME
HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582
IT'S TIME TO "CRY HAVOC"
HS-026 780
REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)
HS-026 728
THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES
HS-026 649

TIRE
COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636
DETERMINATION OF TIRE QUALITY FROM NONDESTRUCTIVE INSPECTION. FINAL REPORT
HS-804 828
FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761
THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

TIRES
COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029
CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030
GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681
SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

TORINO
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

TORQUE
REVIEW OF THE AUTOMOTIVE TORQUE CONVERTER
HS-026 661

TOW
DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327
DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

TOWNS
SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]
HS-026 733

TRACK

AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

TRACKS

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

TRACTIVE

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

TRACTOR

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

TRACTORS

IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

TRADEOFF

ALCOHOL AND SPEED-ACCURACY TRADEOFF
HS-026 714

TRAFFIC

CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT
HS-026 739

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?
HS-026 570

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

METHODS OF TRAFFIC LIMITATION IN URBAN AREAS
HS-026 709

REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)
HS-026 728

RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

TRAFFIC ANALYSIS ANNUAL REPORT, CALENDAR YEAR 1978 [DISTRICT OF COLUMBIA]
HS-026 569

TRAFFIC CONTROL DEVICES, VISIBILITY, AND GEOMETRICS
HS-026 684

TRAFFIC SAFETY '78. A DIGEST OF ACTIVITIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
HS-805 100

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]
HS-026 667

TRAILER

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

TRANSFER

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

TRANSFORMER

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

TRANSIENT

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

TRANSIENT CONTROL RESPONSE OF AUTOMOBILES
HS-026 634

TRANSIT

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

TRANSMISSION

DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

TRANSPORT

ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

SURFACE TRANSPORT REGULATION AND RAILROAD PLANNING
HS-026 765

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

TRANSPORTATION

CONSOLIDATED TRANSPORTATION PROGRAM (1978-1982), MARYLAND
HS-026 703

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

RELATION BETWEEN LIGHTING PARAMETERS AND TRANSPORTATION PERFORMANCE
HS-026 693

TRANSPORTATION AND THE FUTURE
HS-026 738

TRAVEL

CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]
HS-026 733

TREATMENT

EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

TREATMENTS

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

TRENDS

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY
HS-026 674

VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS
HS-026 766

TRIP

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT
HS-803 668

TRUCK

HOW TO BUY A BODY FOR A UTILITY TRUCK
HS-026 771

HOW TO BUY A TRUCK FRAME FOR A UTILITY VEHICLE
HS-026 770

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK
HS-026 643

RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY
HS-026 674

THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT
HS-026 682

TRUCKS

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS
HS-026 675

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

TUNNELS

SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS
HS-026 591

TURBINE

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

TURBULENT

TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

TURN

TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE
HS-026 697

TUTORIAL

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

TYPE

FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

TYPES

PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

TYRE

COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

ULTRASONIC

COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

UNDERCROSSINGS

TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

UNION

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

UNITED

CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977
HS-026 581

EVALUATION OF PROGRAMS IN THE DEPARTMENT OF TRANSPORTATION--AN ASSESSMENT. REPORT TO THE CONGRESS OF THE UNITED STATES BY THE COMPTROLLER GENERAL
HS-026 702

THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

UNITS

THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

UNIVERSITY

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

URBAN

ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING
HS-026 713

ENVIRONMENTAL IMPLICATIONS OF OPTIONS IN URBAN MOBILITY: OBSERVATIONS OF THE ENVIRONMENT COMMITTEE OF OECD [ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT]
HS-026 707

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?
HS-026 570

METHODS OF TRAFFIC LIMITATION IN URBAN AREAS
HS-026 709

SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

US

THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

USER

ROAD USER INFORMATION NEEDS, PEDESTRIAN MOVEMENT, AND BICYCLE TRAVEL PATTERNS
HS-026 724

UTILITY

ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

HOW TO BUY A BODY FOR A UTILITY TRUCK
HS-026 771

HOW TO BUY A TRUCK FRAME FOR A UTILITY VEHICLE
HS-026 770

VACUUM

12-VOLT AUTOMOBILE VACUUM CLEANERS
HS-026 782

VALVE

SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB
HS-026 572

VAN

BASELINE TESTS OF THE ELECTRA-VAN MULTI-PURPOSE ELECTRIC VAN
HS-026 740

RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY
HS-026 674

VANE

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

VANPOOL

COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

VANS

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

VARIABLE

COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

VARIATION

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

VEHICLE

A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY
HS-805 322

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION
HS-805 323

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT
HS-805 321

HOW TO BUY A TRUCK FRAME FOR A UTILITY VEHICLE
HS-026 770

IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

LAWS FOR LAWS' SAKE? [VEHICLE RECALLS]
HS-026 775

MOTOR VEHICLE STATISTICS OF JAPAN 1979
HS-026 579

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE
HS-026 644

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR
HS-026 645

THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES
HS-026 649

THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS
HS-026 766

VEHICLES

ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT
HS-804 775

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS
HS-026 653

ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT
HS-805 205

EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES
HS-026 641

PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1, 1979 TO DECEMBER 31, 1979
HS-805 265

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

VIBRATIONS

FRONT WHEEL VIBRATIONS
HS-026 630

VICTIM

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIM-

ULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT

HS-026 677

VIENNA

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977

HS-026 629

VISIBILITY

EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS

HS-026 691

TRAFFIC CONTROL DEVICES, VISIBILITY, AND GEOMETRICS

HS-026 684

VISION

REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)

HS-026 694

VISUAL

VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS

HS-805 051

VOLT

12-VOLT AUTOMOBILE VACUUM CLEANERS

HS-026 782

VOLUME

COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)

HS-026 687

VOLUMES

1978 ACCIDENT DATA. TRAFFIC VOLUMES AND MILEAGE ON THE STATE HIGHWAY SYSTEM BY ROUTE, COUNTY AND MUNICIPALITY [NEW JERSEY]

HS-026 667

VOLVO

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT

HS-805 170

VSD

THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977

HS-026 629

WARRANTS

SIGNING WARRANTS FOR NONSERVICE FACILITIES (ABRIDGMENT)

HS-026 688

WEAR

DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS

HS-026 772

WEEKEND

DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978

HS-026 778

WEIGH

WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT

HS-026 682

WEIGHT

A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT

HS-026 590

VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS

HS-026 766

WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT

HS-026 682

WEIGHT STUDY: 1978 CHRYSLER OMNI. FINAL REPORT

HS-804 720

WHEEL

A BRIGHT FUTURE FOR WHEEL BALANCING

HS-026 779

CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT

HS-805 030

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT

HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT

HS-805 329

FRONT WHEEL VIBRATIONS

HS-026 630

VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY

HS-026 654

WHITE

THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING

HS-026 666

WINTER

MOTOR GASOLINES, WINTER 1978-79

HS-026 774

PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP

HS-026 729

WOMEN
THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

WOOD
PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

WORK
CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

YELLOW
EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

ZONE
CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

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Author Index

Alexandridis, A. A.
THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

Allison, Joseph R.
PERFORMANCE OF HIGHWAY SAFETY DEVICES
HS-026 746

Anderson, Mary R.
CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

Anderson, Roy E.
LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

Andrews, James C.
PHYSICIAN REPORTING OF THE IMPAIRED DRIVER
HS-026 781

Ashford, Norman
EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

Baechtel, John
BRINGING UP THE REAR: A BULLETPROOF 9-INCH FORD REAREND FOR PERFORMANCE CARS
HS-026 762

Baguley, C.
SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW
HS-026 593

Bailey, Cornelius E. , Jr.
BASELINE TESTS OF THE ELECTRA-VAN MULTI-PURPOSE ELECTRIC VAN
HS-026 740

Bak, Paul E.
NEW 7.5- AND 8.5-INCH FORD AXLES FOR 1979
HS-026 663

Bampfylde, A. P.
SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS
HS-026 591

Barkey, Patrick M.
ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

Barkey, Patrick N.
ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

Baum, A. Stephen
ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

Beachley, Norman H.
EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

Bennett, Robert O.
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

Berinsky, S.
THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

Berkhout, Jan
INFORMATION TRANSFER CHARACTERISTICS OF MOVING LIGHT SIGNALS [ON EMERGENCY VEHICLES]
HS-026 715

Berube, George
COMPARISON OF PRE AND POST ROAD TEST ULTRASONIC INSPECTION RESULTS ON 134 PASSENGER TIRES. FINAL REPORT
HS-805 029

Bisimis, E.
THE USE OF SYSTEM IDENTIFICATION METHODS FOR THE DETERMINATION OF VEHICLE PARAMETERS FROM MEASURED TIME HISTORIES
HS-026 649

Blake, William H.
BASELINE TESTS OF THE ELECTRA-VAN MULTI-PURPOSE ELECTRIC VAN
HS-026 740

Bobo, Stephen N.
CORRELATION BETWEEN ULTRASONIC NONDESTRUCTIVE INSPECTION AND WHEEL TEST OF 34 RETREADED TIRES. FINAL REPORT
HS-805 030

DETERMINATION OF TIRE QUALITY FROM NONDESTRUCTIVE INSPECTION. FINAL REPORT
HS-804 828

Bohm, F.
COMPUTING AND MEASUREMENTS OF THE HANDLING QUALITITES OF THE BELTED TYRE [TIRE]
HS-026 636

Bosker, Gordon W.
A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

Bowman, Bruce M.
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

Brandl, F.
TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

Brisken, Axel F.
LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

Bryden, James E.
EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

PERFORMANCE OF HIGHWAY SAFETY DEVICES
HS-026 746

Burco, Robert A.
URBAN PUBLIC TRANSPORT: SERVICE INNOVATIONS IN OPERATIONS, PLANNING AND TECHNOLOGY
HS-026 708

Burg, Albert
REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)
HS-026 694

Burritt, Benjamin E.
ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

Burton, Fred T.
DUAL PHASE STEEL PRODUCTION BUMPERS
HS-026 719

Cadotte, Ernest R.
SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

Calcote, L. R.
COST-EFFECTIVENESS MODEL FOR GUARDRAIL SELECTION (ABRIDGEMENT)
HS-026 747

PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

Campbell, Michael D.
RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

Campbell, William D.
DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

Cantab, M. A.
PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

Carlson, Robert D.
PERFORMANCE OF HIGHWAY SAFETY DEVICES
HS-026 746

Carlson, William L.
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760

Carney, John F. , 3rd.
EXPERIMENTAL EVALUATION OF A PORTABLE ENERGY-ABSORBING SYSTEM FOR HIGHWAY SERVICE VEHICLES (ABRIDGMENT)
HS-026 750

Carson, Joseph G.
IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

Cartellieri, W.
TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

Carvell, James D.
REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)
HS-026 728

Chao, Peter Ju-Cheng
CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

Chatterjee, Arun
SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

Chisholm, Douglas B.
DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

Christ, H.
AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

Cioili, Henry J.
COMPUTERIZED FACILITY FOR ENGINE DEVELOPMENT
HS-026 769

Clark, L. G.
FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

Claybrook, Joan
IT'S TIME TO "CRY HAVOC"
HS-026 780

Clemens, William J.
POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY
HS-026 660

Cleveland, Donald E.
MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS
HS-026 696

Cropper, R.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

Culler, Ralph E.
RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

Cunard, Richard A.
COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

Cunningham, Alan R.
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

Danzo, J. N.
EMISSION FACILITY DESIGN CRITERIA
HS-026 723

Darenberg, W.
AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

Dart, Olin K. , Jr.
EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

Darwick, Norman
ENFORCEMENT OF THE NATIONAL MAXIMUM SPEED LIMIT. ENFORCEMENT PRACTICES AND PROCEDURES. FINAL TECHNICAL REPORT
HS-805 175

Datta, Tapan K.
COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

Davis, Robert M.
CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

Davis, S.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

Day, Richard
SICK ENGINE? DON'T BE AFRAID OF A DIY [DO-IT-YOURSELF] VALVE JOB
HS-026 572

Dent, J. C.
TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

Dinitz, Arthur M.
DEVELOPMENT AND TESTING OF A BREAKAWAY SUPPORT COUPLING FOR LIGHT POLES (ABRIDGMENT)
HS-026 753

Dinkel, John
THE AFTERMATH: AIR BAGS AND US. ROAD AND TRACK READERS RESPOND TO THE PASSIVE RESTRAINT CONTROVERSY
HS-026 744

Dokainish, M. A.
DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT
HS-026 646

Douglass, Richard L.
ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

Dowgiallo, Edward J. , Jr.
BASELINE TESTS OF THE ELECTRA-VAN MULTI-PURPOSE ELECTRIC VAN
HS-026 740

Downs, Anthony
THE AUTOMOTIVE POPULATION EXPLOSION
HS-026 574

Duchstein, Detlev

TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)

HS 026 767

Dudek, C. L.

HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT

HS-026 582

Dudek, Conrad L.

ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)

HS-026 726

LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)

HS-026 727

REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)

HS-026 728

Duffek, W.

A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS

HS-026 637

Eberan-Eberhorst, C. G. A.

PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS

HS-026 721

Eccleston, B. H.

AMBIENT TEMPERATURE, FUEL ECONOMY, EMISSIONS, AND TRIP LENGTH. FINAL REPORT

HS-803 668

Eckel, Clifford

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT

HS-805 164

Edmonds, H. John

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT

HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT

HS-805 274

Effenberger, Michael J.

EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST

HS-026 757

Ellis, J. R.

A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES

HS-026 642

ElMadany, M. M.

DYNAMIC RESPONSE OF TRACTOR-SEMITRAILER VEHICLE TO RANDOM INPUT

HS-026 646

Ervin, Robert D.

IMPROVING ANTI-ROLL PROPERTIES OF SEMI-TRAILERS, ROAD TRACTORS, AND HEAVY TRUCKS

HS-026 675

Evans, Leonard

DRIVER BEHAVIOR EFFECTS ON FUEL CONSUMPTION IN URBAN DRIVING

HS-026 713

HOW DOES TRAFFIC SPEED AFFECT URBAN FUEL CONSUMPTION?

HS-026 570

Fabian, G. J. , ed.

CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES

HS-805 302

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY

HS-805 322

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION

HS-805 323

Fancher, Paul S. , Jr.

PITCHING AND BOUNCING DYNAMICS EXCITED DURING ANTILOCK BRAKING OF A HEAVY TRUCK

HS-026 643

Faris, William R.

COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT

HS-805 049

Fauth, Gary R.

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT

HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT

HS-026 759

Feiler, L. G. , 3rd.

EMISSION FACILITY DESIGN CRITERIA

HS-026 723

Filkins, Lyle D.

MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT

HS-805 177

Finelstein, Barry

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT

HS-805 180

Finkelstein, Barry
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

Fish, Roger
PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

Flachsbart, Peter G.
EVALUATING MOTOR FUEL CONSERVATION POLICIES AT THE COMMUNITY LEVEL
HS-026 576

Frank, Andrew A.
EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

Free, John
COMPUTERIZED CARS. ON-BOARD MICROPROCESSORS SPARK A REVOLUTION IN AUTOMOBILE ENGINEERING
HS-026 571

Frey, Richard L.
LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

Frig, G. E. , ed.
CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

Gakenheimer, Ralph , ed.
THE AUTOMOBILE AND THE ENVIRONMENT: AN INTERNATIONAL PERSPECTIVE
HS-026 706

Gillespie, Thomas D.
ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES
HS-026 641

Ginn, J. Royce
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

Glennon, John C.
HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY
HS-026 699
SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

Greeves, G.
RESPONSE OF DIESEL COMBUSTION SYSTEMS TO INCREASE OF FUEL INJECTION RATE
HS-026 656

Grose, Charles W.
HOW TO BUY A BODY FOR A UTILITY TRUCK
HS-026 771

Gurney, Gary F.
EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

Hall, Dana L.
COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

Hall, Jerome W.
ROADSIDE HAZARD MODEL (ABRIDGMENT)
HS-026 695

Hames, Less N.
INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

Hanson, Robert H.
NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273
NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

Harris, Douglas H.
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Harris, Rodney W.
TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192
TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

Harris, Winfred A.
TRAFFIC ANALYSIS ANNUAL REPORT, CALENDAR YEAR 1978 [DISTRICT OF COLUMBIA]
HS-026 569

Hartgen, David T.
PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP
HS-026 729

Harwood, Douglas W.
HIGHWAY DESIGN CONSISTENCY AND SYSTEMATIC DESIGN RELATED TO HIGHWAY SAFETY
HS-026 699

SELECTION OF MEDIAN TREATMENTS FOR EXISTING ARTERIAL HIGHWAYS
HS-026 698

Haviland, John E.
DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

Heaton, Carla
COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

Hendzel, E. T.
HOW TO BUY A TRUCK FRAME FOR A UTILITY VEHICLE
HS-026 770

Hepburn, Mary
DIABETIC FIGHTS FOR RIGHT TO GET A CLASS A LICENSE
HS-026 587

Hergenrother, K. M.
COMPARISON OF FUEL ECONOMY AND EMISSIONS FOR DIESEL AND GASOLINE POWERED TAXICABS. FINAL REPORT
HS-026 679

Hill, Daniel H.
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

Hill, Martha S.
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

Hills, Brian L.
REANALYSIS OF CALIFORNIA DRIVER-VISION DATA: GENERAL FINDINGS (ABRIDGMENT)
HS-026 694

Holahan, Charles J.
RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

Hollinger, R. L.
BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)
HS-026 756

Hong, H. K.
THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

Howard, Tony
LAWS FOR LAWS' SAKE? [VEHICLE RECALLS]
HS-026 775

Howell, L. J.
THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

Howlett, James B.
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Huelke, Donald F.
INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

Hume, Rex D.
TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

Hunter, William W.
EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

Hutchingson, R. D.
HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

Hutchingson, R. Dale
ADVANCE ROAD SIGN MESSAGES FOR HIGHWAY ADVISORY RADIO SYSTEMS (ABRIDGMENT)
HS-026 726

Hutchinson, John W.
PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)
HS-026 689

Iannelli, Dominic
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

Ibison, Richard
ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 777

Isaccs, Madelyn C.
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

Jacobsen, R. M.
FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT–A NEW CHALLENGE
HS-026 722

Jacobson, Jesse
COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

Jaksch, Friedrich O.
DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

Jayawant, B. V.
DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS
HS-026 653

Jillesma, P. J.
FRONT WHEEL VIBRATIONS
HS-026 630

Joksch, Hans C.
EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT
HS-805 321

Jones, C. J.
THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

Jones, Ian S.
ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

Josey, James L.
MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

Kain, John F.
FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT
HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

Kamash, K. M. A.
ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE
HS-026 644

Kamel, M.
THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

Kaplan, Richard J.
RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY
HS-026 674

THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

Katz, Allan
SOME CHARACTERISTICS OF BICYCLE TRAVEL AND ACCIDENTS IN TOWNS [IN ISRAEL]
HS-026 733

Kearney, Edward F.
RULES OF THE ROAD RATED [1979]
HS-805 119

Kemp, R. N.
ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

Kimball, C. E.
PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

PROPERTIES OF GUARDRAIL POSTS FOR VARIOUS SOIL TYPES
HS-026 752

Kirk, N. S.
EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

Kirkby, C.
EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

Kirksey, R. E.
TEST VEHICLE KINEMATICS BY HIGH-SPEED PHOTOGRAPHY AND ACCELEROMETER DATA (ABRIDGMENT)
HS-026 749

Kitamura, Ryuichi
MACROSCOPIC MODELING OF TWO-LANE RURAL ROADSIDE ACCIDENTS
HS-026 696

Klein, Richard H.
DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1--REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

Knott, Verner J.
EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

Kofskey, Milton G.
COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

Koppa, R. J.
HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

Kortum, W.
A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

Krettek, O.
THE BEHAVIOUR OF TRACTIVE UNITS AT SKIDDING WITH DIFFERENT KINDS OF PROPULSION AS A DYNAMICAL AND A STATISTICAL PROBLEM
HS-026 655

Kriss, Matthew
WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT
HS-026 682

Kubacki, Michael
MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

Kumove, Moshe
ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

Kuner, Rick
ALTERNATIVES ANALYSIS FOR ARTERIAL STREETS
HS-026 578

Lane, P. D.
DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

Laursen, Norman W.
AN EMISSION TEST FACILITY FOR MEASURING CATALYTIC CONVERTER EFFICIENCIES
HS-026 768

Layton, Robert D.
VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS
HS-026 766

Lee, Ken
MOTOR COPS
HS-026 776

Lee, T. H.
THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

Lewis, Alvin C.
GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

Lewis, Ernest , Jr.
GUIDE TO HIGH SPEED PATROL CAR TIRES (LAW ENFORCEMENT EQUIPMENT TECHNOLOGY)
HS-026 681

Lewis, James R.
LAND MOBILE COMMUNICATIONS AND POSITION FIXING USING SATELLITES
HS-026 763

Lindsley, E. F.
MORE MILES FROM A BARREL OF CRUDE: A FRESH WAY OF LOOKING AT AUTOMOBILE FUEL ECONOMY SPURS BACK-TO-BASICS COMBUSTION RESEARCH
HS-026 764

Lott, Dale F.
EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

Lott, Donna Y.
EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

Louckes, T. N.
EMISSION FACILITY DESIGN CRITERIA
HS-026 723

Ludtke, Norman F.
WEIGHT STUDY: 1978 CHRYSLER OMNI. FINAL REPORT
HS-804 720

Lugner, Peter
THE INFLUENCE OF THE STRUCTURE OF AUTOMOBILE MODELS AND TYRE [TIRE] CHARACTERISTICS ON THE THEORETICAL RESULTS OF STEADY-STATE AND TRANSIENT VEHICLE PERFORMANCE
HS-026 631

Maeda, T.
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

Maeda, Y.
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

Maki, Martti
DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

Manduzzi, Denis J.
NEW 7.5- AND 8.5-INCH FORD AXLES FOR 1979
HS-026 663

Manheim, Marvin L.
THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

Manski, Charles F.
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

Mantey, Harvey H. L.
DUAL PHASE STEEL PRODUCTION BUMPERS
HS-026 719

Martin, H.
PERFORMANCE TEST METHODS FOR TWO-STROKE CYCLE ENGINE LUBRICANTS INCLUDING LEAN FUEL-OIL RATIO CONDITIONS
HS-026 721

Mast, T. M.
HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

Matthews, Michael L.
IMPACT OF HIGHWAY METRICATION ON TRAFFIC ACCIDENTS AND LONG-TERM TRENDS IN VEHICLE SPEEDS FOR ROADS WITH RESULTANT INCREASED SPEED LIMITS
HS-026 717

Matthias, Judson S.
ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

Mazzola, Robert A.
PLANNING FOR AUTOMOTIVE ELECTRONIC INSTRUMENTATION
HS-026 665

McCaffree, C. R.
FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT--A NEW CHALLENGE
HS-026 722

McDivitt, Judith A.
MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW
HS-026 732

McGee, Hugh W.
COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

McGillick, Richard F.
AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

McLallin, Kerry L.
COLD-AIR PERFORMANCE OF FREE POWER TURBINE DESIGNED FOR 112-KILOWATT AUTOMOTIVE GAS-TURBINE ENGINE. 2. EFFECTS OF VARIABLE STATOR-VANE-CHORD SETTING ANGLE ON TURBINE PERFORMANCE. FINAL REPORT
HS-026 704

McLean, Robert F.
COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARD 201 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 162

STUDY OF THE EFFECTS OF APPLYING FEDERAL MOTOR VEHICLE SAFETY STANDARDS 203 AND 204 TO LIGHT TRUCKS AND VANS. FINAL REPORT
HS-805 163

McNaught, Earl D.
EVALUATION OF YELLOW-ON-BROWN ROAD SIGNS FOR THE ADIRONDACK PARK (ABRIDGMENT)
HS-026 686

Meletiou, Mary Paul
NORTH CAROLINA'S BICYCLING HIGHWAYS
HS-026 736

Mercure, Robert A.
REVIEW OF THE AUTOMOTIVE TORQUE CONVERTER
HS-026 661

Michael, Harold L.
COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

Michie, J. D.
PENDULUM TESTS OF BREAKAWAY WOOD SIGN SUPPORTS USING CRUSHABLE BUMPERS
HS-026 755

Moghrabi, A.
ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

Monaghan, M. L.
TWO WAYS TO BOOST A LIGHT DUTY DIESEL
HS-026 657

Moore, William Shepherd
ECONOMIC ANALYSIS OF ALCOHOL SAFETY COUNTERMEASURES
HS-026 670

Morganstein, David R.
NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

Moses, Fred
WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT
HS-026 682

Mulinazzi, Thomas E.
ROADSIDE HAZARD MODEL (ABRIDGMENT)
HS-026 695

Mullowney, William L.
EVALUATION OF DELINEATION SYSTEMS FOR THE NEW JERSEY BARRIER
HS-026 685
SIGNING WARRANTS FOR NONSERVICE FACILITIES (ABRIDGMENT)
HS-026 688

Murata, Takahiro
CREATION OF PEDESTRIAN STREETS IN CITY CENTERS (ABRIDGMENT)
HS-026 730

Negri, D. Barry
ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 777

Neilson, I. D.
ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

Nemeth, Zoltan Anthony
TWO-WAY LEFT-TURN LANES: STATE-OF-THE-ART OVERVIEW AND IMPLEMENTATION GUIDE
HS-026 697

Nichols, James L.
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760

O'Day, James
MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177
RECENT TRENDS IN VAN AND SMALL TRUCK SAFETY
HS-026 674
THE FARS [FATAL ACCIDENT REPORTING SYSTEM] DATA AND SIDE-IMPACT COLLISIONS
HS-026 676

Owen, Wilfred
AUTOMOBILES AND CITIES: STRATEGIES FOR DEVELOPING COUNTRIES
HS-026 711

Pacejka, H. B.
FRONT WHEEL VIBRATIONS
HS-026 630

Panik, F.
AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

Parker, C. D.
AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT
HS-805 128

Parsonson, Peter S.
SIGNALIZATION OF HIGH-SPEED, ISOLATED INTERSECTIONS
HS-026 692

Patterson, Donald G.
EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

Penttila, Antti
DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

Perkins, David D.
COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

Petrucelli, Elaine
INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

Petts, Richard A.
DESIGN AND DEVELOPMENT OF A SINGLE RAIL SHIFT OVERDRIVE (SROD) MANUAL TRANSMISSION
HS-026 662

Phillips, O. H.
DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

Pikkarainen, Jarmo
DRUNKEN DRIVING IN FINLAND. LATE-NIGHT, WEEKEND INCIDENCE IN FIVE COMMUNITIES IN 1978
HS-026 778

Poage, James
COMPARISON OF ORGANIZATIONAL AND OPERATIONAL ASPECTS OF FOUR VANPOOL DEMONSTRATION PROJECTS. FINAL REPORT
HS-026 683

Polus, Abishai
ACCESSIBILITY MEASURES USED TO APPRAISE TRANSPORT SYSTEM PERFORMANCE
HS-026 577

Porter, G. J. D.
SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS
HS-026 591

Powers, J. C.
BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)
HS-026 756

Priest, S. D.
SPEED/FLOW RELATIONSHIPS IN ROAD TUNNELS
HS-026 591

Promisel, David M.
EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

Pullen, Ted A.
PERFORMANCE OF SIGNS UNDER DEW AND FROST CONDITIONS (ABRIDGMENT)
HS-026 689

Reidy, Joseph C. , Jr.
EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT
HS-805 321

Reiss, Martin L.
COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

Renouf, M. A.
PREDICTION OF THE FUEL CONSUMPTION OF HEAVY GOODS VEHICLES BY COMPUTER SIMULATION
HS-026 592

Repa, B. S.
THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

Reverencic, I.
TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

Richards, S. H.
HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

Richardson, Herbert H.
PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

Richerson, Michael E.
A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

Ridgeway, R. Glen
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Ripperger, E. A.
FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

Robbins, D. Hurley
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE. FINAL REPORT
HS-026 677

Robertson, Leon S.
STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

Robicheaux, Robert A.
SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

Robson, J. D.
ROAD SURFACE DESCRIPTION IN RELATION TO VEHICLE RESPONSE
HS-026 644

Rompe, Klaus
A COMPARISON BETWEEN FOUR COMPUTING MODELS OF DIFFERENT COMPLEXITY DESCRIBING THE STEERING BEHAVIOUR OF TWO-AXLED AUTOMOBILES
HS-026 633

Roozbazar, A.
A THEORETICAL MODEL TO ESTIMATE SOME ERGONOMIC PARAMETERS FROM AGE, HEIGHT AND WEIGHT
HS-026 590

Rosenberg, Nathan
EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
.IS-026 669

Ross, Hayes E. , Jr.
EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

Ruddle, J. C.
AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT
HS-805 128

Rundell, O. H.
ALCOHOL AND SPEED-ACCURACY TRADEOFF
HS-026 714

Sachs, H. K.
AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
HS-026 648

Sattaripour, A.
THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR
HS-026 645

Sauer, Theodore C.
AUTOMOTIVE LUBE OIL FILTERS FOR EXTENDED SERVICE AT HIGH CRANKCASE OIL TEMPERATURES
HS-026 773

Schiehlen, Werner O.
DYNAMICAL ANALYSIS OF SUSPENSION SYSTEMS
HS-026 632

Schrader, W. T.
THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR. FINAL REPORT
HS-026 718

Schreuder, D. A.
RELATION BETWEEN LIGHTING PARAMETERS AND TRANSPORTATION PERFORMANCE
HS-026 693

Schroth, Robert T.
ENERGY CONSERVATION POTENTIAL OF LAND-BASED RECREATIONAL MOTOR VEHICLES. FINAL REPORT
HS-805 205

Schultz, Mort
HOW TO CHECK, SELECT AND REPLACE SHOCK ABSORBERS
HS-026 589

Scott, Robert E.
MULTILEVEL STUDY OF ACCIDENT CAUSATION AND AVOIDANCE: PHASE 1A PLANNING REPORT. INTERIM REPORT
HS-805 177

Seaver, W. Burleigh
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760

Segal, David J.
DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

Seidel, Larry
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

Selim, Ali A.
MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

Shadday, M. C.
DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

Sharp, R. S.
THE STRAIGHT-RUNNING STABILITY OF SINGLE TRACK VEHICLES
HS-026 652

Shaw, M.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

Shea, Richard
THE SEARCH FOR A NEW KIND OF CAR. PRESIDENT CALLS AUTO-MAKERS TO WHITE HOUSE FOR MEETING
HS-026 666

Shelton, Ella Mae
MOTOR GASOLINES, WINTER 1978-79
HS-026 774

Sherman, Leonard
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

Shladover, Steven E.
PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

Shonka, D. B.
CHARACTERISTICS OF AUTOMOTIVE FLEETS IN THE UNITED STATES 1966-1977
HS-026 581

Siegner, Helge
THE SUSPA SOLID IMPACT SHOCK-ABSORBER, SYSTEM MENASCO (DER SUSPA-FESTSTOFF-AUFPRALLDAMPFER, SYSTEM MENASCO)
HS-026 705

Singh, M.
AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
HS-026 648

Sinha, Kumares C.
COMPREHENSIVE EVALUATION OF NONSIGNALIZED CONTROL AT LOW-VOLUME INTERSECTIONS (ABRIDGMENT)
HS-026 687

Slater, Courtenay
IN AUTO SHOWROOMS: THE CONSUMER ONCE AGAIN BEGINS TO THINK SMALL
HS-026 588

Slibar, A.
THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

Slibar, I. , ed.
THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

Smith, N. P.
TRANSIENT CONTROL RESPONSE OF AUTOMOBILES
HS-026 634

Snellings, Ivan R.
BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN
HS-026 740

Soffer, Douglas
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

Springer, H. , ed.
THE DYNAMICS OF VEHICLES ON ROADS AND ON TRACKS. PROCEEDINGS OF 5TH VSD [VEHICLE SYSTEM DYNAMICS]- 2ND IUTAM [INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS] SYMPOSIUM HELD AT THE TECHNICAL UNIVERSITY VIENNA, AUSTRIA, SPETEMBER 19-23, 1977
HS-026 629

Springer, H.
THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

Starmer, C. F.
AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT
HS-805 128

States, John D.
INJURY CODING MANUAL 1980. FINAL REPORT
HS-805 298

Stockton, W. R.
HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS. VOL. 1, DESIGN GUIDE. FINAL REPORT
HS-026 582

Stockton, William R.
LEGIBILITY STUDY OF A LAMP MATRIX SIGN (ABRIDGMENT)
HS-026 727

Stroud, P.
EVALUATION OF DAYTIME HIGH-VISIBILITY AIDS FOR MOTORCYCLISTS
HS-026 691

Suhrbier, John H.
THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

Sumner, R.
SPEED CONTROL HUMPS IN KENSINGTON AND GLASGOW
HS-026 593

Swan, Sherrill
TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

Sweeney, Lawrence J.
EVALUATION OF BOLTED-BASE STEEL CHANNEL SIGNPOST
HS-026 757

Szalaj, W. M.
BREAKAWAY SIGN TESTING, PHASE I (ABRIDGMENT)
HS-026 756

Szostak, Henry T.
DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 326

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 2: TECHNICAL REPORT FOR PHASE 1–REAR WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 327

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2–FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
HS-805 329

Tamura, K.
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

Tanabe, T.
EVALUATION OF LUBRICANTS FOR JAPANESE SMALL AIR-COOLED TWO-CYCLE ENGINES
HS-026 720

Tardiff, Timothy
EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

Taylor, Theodore , Jr.
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

Thomson, J. Michael
METHODS OF TRAFFIC LIMITATION IN URBAN AREAS
HS-026 709

Timtner, Karlheinz
TEMPERATURE CALCULATION AND PRACTICAL APPLICATION OF BRAKE DISKS (TEMPERATURBERECHNUNGEN VON BREMSSCHEIBEN UND IHRE PRAKTISCHE ANWENDUNG)
HS-026 767

Towle, Leland H.
EVALUATION OF ALCOHOLISM TREATMENT PROGRAMS FOR DRINKING DRIVERS
HS-026 669

Treat, John R.
TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-805 192

TRUCK, BUS, AND MOTORCYCLE SAFETY STATUS METHODOLOGY. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 193

Tresselt, Carl P.
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

Troger, H.
THE STEADY-STATE-BEHAVIOUR OF A TRUCK-TRAILER-SYSTEM CARRYING RIGID OR LIQUID LOAD
HS-026 647

Turner, J. Michael
REAL-TIME DIVERSION OF FREEWAY TRAFFIC DURING MAINTENANCE OPERATIONS (ABRIDGMENT)
HS-026 728

Vallette, Gerald R.
MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW
HS-026 732

Van Den Berg, J.
FRONT WHEEL VIBRATIONS
HS-026 630

Van Ooij, W. J.
FUNDAMENTAL ASPECTS OF RUBBER ADHESION TO BRASS-PLATED STEEL TIRE CORDS
HS-026 761

Venables, Peter H.
EEG [ELECTROENCEPHALOGRAM] ALPHA CORRELATES OF ALCOHOL CONSUMPTION IN SMOKERS AND NONSMOKERS. EFFECTS OF SMOKING AND SMOKING DEPRIVATION
HS-026 678

Veselka, Ceclia
RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

Voas, Robert B.
DRIVER EDUCATION AND THE LICENSING OF 16 AND 17 YEAR OLDS
HS-026 760

Wagenaar, Alexander C.
ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. FINAL REPORT
HS-026 783

ALCOHOL AVAILABILITY, CONSUMPTION AND THE INCIDENCE OF ALCOHOL-RELATED SOCIAL AND HEALTH PROBLEMS IN MICHIGAN. EXECUTIVE SUMMARY. FINAL REPORT
HS-026 784

Wagner, Marvin H.
ADMINISTRATIVE ADJUDICATION OF DRIVING-WHILE-INTOXICATED OFFENSES
HS-026 671

Waksberg, Joseph
NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. EXECUTIVE SUMMARY. FINAL REPORT
HS-805 273

NATIONAL ACCIDENT SAMPLING SYSTEM. SAMPLE DESIGN, PHASES 2 AND 3. VOL 1: FINAL TECHNICAL REPORT
HS-805 274

Wallrapp, O.
A GENERAL PURPOSE PROGRAM FOR THE SIMULATION OF VEHICLE-GUIDEWAY INTERACTION DYNAMICS
HS-026 637

Watson, N.
THERMODYNAMIC EFFICIENCY EVALUATION OF AN INDIRECT INJECTION DIESEL ENGINE
HS-026 658

Wegmann, Frederick J.
SHORT-RANGE PLANNING FOR URBAN GOODS MOVEMENT
HS-026 575

Weidemann, W.
AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

Weir, David H.
ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 330

Weisz, G.
THEORETICAL INVESTIGATION ON NON-STEADY-STATE DRIVING CONDITIONS OF A MOTOR VEHICLE
HS-026 635

West, L. B.
AMBULANCE ELECTRICAL SYSTEM STUDY. FINAL REPORT
HS-805 128

Whitcomb, William G.
VEHICLE SIZE AND WEIGHT REGULATIONS, PERMIT OPERATION, AND FUTURE TRENDS
HS-026 766

White, Robert M.
THE ANTHROPOMETRY OF UNITED STATES ARMY MEN AND WOMEN: 1946-1977
HS-026 716

Wierwille, W. W.
THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

Wilkins, H. A.
ACCIDENTS INVOLVING HEAVY GOODS VEHICLES [COMMERCIAL TRUCKS] IN GREAT BRITAIN: FREQUENCIES AND DESIGN ASPECTS
HS-026 595

Williams, Harold L.
ALCOHOL AND SPEED-ACCURACY TRADEOFF
HS-026 714

Wing, C. E.
EMISSION FACILITY DESIGN CRITERIA
HS-026 723

Winkler, Christopher B.
ON THE DIRECTIONAL REPSONSE CHARACTERISTICS OF HEAVY VEHICLES
HS-026 641

Wolf, Peter L.
PEDESTRIAN MOVEMENT AT THE 1980 WINTER OLYMPICS SKI JUMP
HS-026 729

Woltman, H. L.
RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

Wong, Lawrence T.
POWERTRAIN MATCHING FOR BETTER FUEL ECONOMY
HS-026 660

Wood, K.
CAR POOLING: TRAVEL TO WORK AT AN ISOLATED SITE
HS-026 594

Wormley, David N.
PERFORMANCE OF STEERING CONTROLLERS FOR AUTOMATED GUIDEWAY TRANSIT VEHICLES
HS-026 638

Wright, Paul H.
STUDIES OF ROADSIDE HAZARDS FOR PROJECTING FATAL CRASH SITES
HS-026 668

Yates, Curtis B.
NORTH CAROLINA'S BICYCLING HIGHWAYS
HS-026 736

Yee, Henry C.
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

Yee, R.
DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITIES AND AGGRESSIVENESS. VOL. 2: TECHNICAL REPORT. FINAL REPORT
HS-805 167

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 2, 1975 FORD TORINO-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 169

DEVELOPMENT OF A TEST METHODOLOGY FOR EVALUATING CRASH COMPATIBILITY AND AGGRESSIVENESS. TEST REPORT 3, 1975 VOLVO 244DL-TO-NHTSA TEST DEVICE. FINAL REPORT
HS-805 170

Yoo, Chang S.
COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

Young, Bruce O.
CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

Youngblood, W. P.
RELATION BETWEEN SIGN LUMINANCE AND SPECIFIC INTENSITY OF REFLECTIVE MATERIALS
HS-026 690

Zahradka, J.
VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

Zax, Jeffrey
FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 1. FINAL REPORT
HS-026 758

FORECASTING AUTO OWNERSHIP AND MODE CHOICE FOR U.S. METROPOLITAN AREAS. VOL. 2, MODEL EQUATIONS. FINAL REPORT
HS-026 759

Zellner, John W.
ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 330

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Corporate Author Index

Ad Hoc Group to the Environment Com. of OECD
AUTOMOTIVE AIR POLLUTION AND NOISE: IMPLICATIONS FOR PUBLIC POLICY
HS-026 712

Aerojet Services Co., Sacramento, Calif.
CRASH TEST PERFORMANCE OF A GUARDRAIL MEDIAN BARRIER AND TEMPORARY CONSTRUCTION-ZONE CRASH CUSHION (ABRIDGMENT)
HS-026 751

American Management Systems, Inc., 1515 Wilson Blvd., Arlington, Va. 22209
SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 1. FINAL REPORT
HS-805 178

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 2. FINAL REPORT
HS-805 179

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 3. FINAL REPORT
HS-805 180

SYSTEMS FEASIBILITY STUDY: STATES' ASSISTANCE IN DEFECT RECALL CAMPAIGNS. VOL. 4. FINAL REPORT
HS-805 181

Anacapa Sciences, Inc., P.O. Drawer Q, Santa Barbara, Calif. 93102
VISUAL DETECTION OF DRIVING WHILE INTOXICATED. PROJECT INTERIM REPORT: IDENTIFICATION OF VISUAL CUES AND DEVELOPMENT OF DETECTION METHODS
HS-805 051

Arizona Dept. of Transportation
ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

Arizona State Univ.
CYCLIST BEHAVIOR AT SIGNALIZED INTERSECTIONS
HS-026 734

Arizona State Univ., Dept. of Civil Engineering
ANALYSIS OF THE RELATION OF ACCIDENTS AND THE 88-KM/H (55-MPH) SPEED LIMIT ON ARIZONA HIGHWAYS (ABRIDGMENT)
HS-026 673

Army Mobility Equipment Res. and Devel. Command, Electric Power Lab., Fort Belvoir, Va. 22060
BASELINE TESTS OF THE ELECTRA-VAN MULTIPURPOSE ELECTRIC VAN
HS-026 740

Arthur D. Little, Inc., Acorn Park, Cambridge, Mass.
IDENTIFICATION OF APPROACHES FOR THE CONTROL OF HEALTH, ENVIRONMENTAL, AND SAFETY HAZARDS ASSOCIATED WITH AIR BAG USE AND DISPOSAL. FINAL REPORT
HS-805 184

Arya-Mehr Univ., P.O. Box 3406, Tehran, Iran
THE EFFECT OF ROAD ROUGHNESS ON VEHICLE BEHAVIOUR
HS-026 645

AB Volvo, Car Div., Dept. 56200, S-40508 Goteborg, Sweden
DRIVER-VEHICLE INTERACTION WITH RESPECT TO STEERING CONTROLLABILITY
HS-026 650

AVL Prof. List G. m. b. H., Austria
TURBULENT AIR FLOW IN THE COMBUSTION BOWL OF A D. I. [DIRECT INJECTION] DIESEL ENGINE AND ITS EFFECT ON ENGINE PERFORMANCE
HS-026 659

Bartlesville Energy Technology Center, Bartlesville, Okla.
MOTOR GASOLINES, WINTER 1978-79
HS-026 774

Bendix Corp., Res. Labs., Southfield, Mich. 48076
COLLISION AVOIDANCE RADAR BRAKING SYSTEMS INVESTIGATION--PHASE 3 STUDY. FINAL TECHNICAL REPORT
HS-805 049

Bicycle Res. Associates, Davis, Calif.
EVALUATION BY EXPERIENCED RIDERS OF A NEW BICYCLE LANE IN AN ESTABLISHED BIKEWAY SYSTEM
HS-026 735

BioTechnology, Inc., Falls Church, Va.
MODEL PEDESTRIAN SAFETY PROGRAM: AN OVERVIEW
HS-026 732

BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
COMPARISON OF CALIFORNIA ACCIDENT RATES FOR SINGLE AND DOUBLE TRACTOR-TRAILER COMBINATION TRUCKS. FINAL REPORT
HS-026 737

California State Dept. of Education, California Traffic Safety Education Task Force, 721 Capitol Mall, Sacramento, Calif. 95814
CALIFORNIA TRAFFIC SAFETY EDUCATION TASK FORCE REPORT
HS-026 739

Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
CALSPAN CHRYSLER RESEARCH SAFETY VEHICLE PHASE 3 FINAL DESIGN REPORT. VOL. 2: APPENDICES
HS-805 302

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 1: EXECUTIVE SUMMARY
HS-805 322

Calspan Corp., Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14225
CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE. PHASE 3 FINAL TECHNICAL REPORT. VOL. 2: TECHNICAL DISCUSSION
HS-805 323

Calspan Corp., Buffalo, N.Y.
ANALYSIS OF THE PROBLEM OF URBAN UTILITY-POLE ACCIDENTS (ABRIDGMENT)
HS-026 700

DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES
HS-026 754

Cambridge Systematics, Inc.
THE AUTOMOBILE AND THE ENVIRONMENT: IMPLICATIONS FOR THE PLANNING PROCESS
HS-026 710

Cambridge Systematics, Inc., 238 Main St., Cambridge, Mass. 02142
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 339

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. VOL. 2: CONSUMER SENTIMENTS TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-805 340

Case Western Reserve Univ., Dept. of Civil Engineering, Cleveland, Ohio 44106
WEIGH-IN-MOTION INSTRUMENTATION [TRUCK WEIGHT]. FINAL REPORT
HS-026 682

Center for the Environment and Man, Inc., 275 Windsor St., Hartford, Conn. 06120
EFFECTS OF FUTURE CONDITIONS UPON MOTOR VEHICLE SAFETY REQUIREMENTS. FINAL REPORT
HS-805 321

Charles River Associates, 200 Clarendon St., Boston, Mass. 02116
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. EXECUTIVE SUMMARY. FINAL REPORT
HS-804 775

Chevron Chemical Co.
FUTURE TWO-CYCLE ENGINE OIL DEVELOPMENT--A NEW CHALLENGE
HS-026 722

Clemson Univ.
MATHEMATICAL MODELS THAT DESCRIBE LATERAL DISPLACEMENT PHENOMENA (ABRIDGMENT)
HS-026 701

Congress. Senate Com. on Commerce, Science, and Transportation, Washington, D.C.
AUTOMOTIVE DEVELOPMENT. HEARING ON GOVERNMENT/INDUSTRY ROLES IN FUTURE AUTOMOTIVE DEVELOPMENT, MARCH 23, 1979
HS-026 586

Corporate Tech Planning Co., 275 Wyman St., Waltham, Mass. 02154
WEIGHT STUDY: 1978 CHRYSLER OMNI. FINAL REPORT
HS-804 720

Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 1: MASTER PRODUCT SCHEDULES. FINAL REPORT
HS-804 460

Cranfield Inst. of Tech., School of Automotive Studies, Bedford, Beds. MK 43 OAL, England
A MODEL OF THE SEMI-TRAILER VEHICLE INCLUDING ROLL MODES
HS-026 642

Cummins Engine Co., Inc.
DIESEL ENGINE WEAR WITH SPIN-ON BY-PASS LUBE OIL FILTERS
HS-026 772

CKD-praha, zavod Lokomotivka-Sokolovo Vyzkumny ustav motor. lokomotiv, Praha, Czechoslovakia
VARIATION OF CONTACT WHEEL-TAIL [RAIL] FORCES AFTER OVERREACHING CREEP-SLIP ADHESION BOUNDARY
HS-026 654

Daimler-Benz A. G., Stuttgart, Federal Republic of Germany
AUTOMATIC TRACK CONTROL OF VEHICLES. THEORY AND EXPERIMENT
HS-026 640

De Leuw, Cather and Co., San Francisco, Calif.
TREATMENTS OF OVERPASSES AND UNDERCROSSINGS FOR THE DISABLED: EARLY REPORT ON THE STATE OF THE ART (ABRIDGMENT)
HS-026 731

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COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE STANDARDS. TASK 7: COST REVIEW OF PEDESTRIAN SAFETY MODIFICATIONS. FINAL REPORT
HS-805 164

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HS-803 668

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HS-026 661

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HS-805 167

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HS-805 170

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ACCIDENTS INVOLVING HANDICAPPED DRIVERS
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DYNAMIC TESTING OF MALLEABLE ALUMINUM TRANSFORMER BASES FOR HIGHWAY LUMINAIRES

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DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 3: APPENDICES FOR PHASE 1. FINAL REPORT
HS-805 328

DEVELOPMENT OF CAR/TRAILER HANDLING AND BRAKING STANDARDS. VOL. 4: TECHNICAL REPORT FOR PHASE 2--FRONT WHEEL DRIVE TOW CARS. FINAL REPORT
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EVALUATION OF THE HALO EFFECT IN SPEED DETECTION AND ENFORCEMENT (ABRIDGEMENT)
HS-026 672

University of Sussex, Applied Science Lab., Falmer, Brighton, Sussex BN1 9QT, England
DYNAMICAL ASPECTS OF PASSENGER CARRYING VEHICLES USING CONTROLLED D.C. ELECTROMAGNETS
HS-026 653

University of Texas at Austin
RELATION BETWEEN ROADSIDE SIGNS AND TRAFFIC ACCIDENTS: FIELD INVESTIGATION
HS-026 725

University of Texas, Austin, Dept. of Aerospace Engineering, Austin, Tex. 78712
FEASIBILITY OF A FOLLOWER TYPE TRAFFIC STRING CONTROL
HS-026 639

University of Wisconsin, Madison, Wis.
EVALUATION OF THE FLYWHEEL DRIVE CONCEPT FOR PASSENGER VEHICLES
HS-026 664

Virginia Polytechnic Inst. and State Univ., Blacksburg, Va. 24061
THE INFLUENCE OF VEHICLE CONTROL DYNAMICS ON DRIVER-VEHICLE PERFORMANCE
HS-026 651

Wayne State Univ.
COMPUTERIZED INVENTORY AND PRIORITY ANALYSIS FOR ROADSIDE OBSTACLES (ABRIDGMENT)
HS-026 748

Wayne State Univ., Coll. of Engineering, Detroit, Mich.
AUTOMOBILE STABILITY; A STUDY OF THE DOMAINS OF ATTRACTION
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Contract Number Index

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HS-026 704

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HS-026 638

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Oak Ridge National Lab., Energy Div., Oak Ridge, Tenn. 37830
HS-026 581

Report Number Index

pad-79-13 HS-026 702

AD-A065 147 HS-026 740

BETC/PPS-79/3 HS-026 774

CE-78-1 HS-026 682

DOE-110 HS-026 774

DOE/NASA/1011-78/28 HS-026 704

DOT-HS-6-01387-77-TBM-Vol-1 HS-805 192

DOT-HS-6-01387-77-TBM-Vol-2 HS-805 193

DOT-TSC-NHTSA-79.29.I HS-804 460

DOT-TSC-NHTSA-79-30 HS-804 828

DOT-TSC-NHTSA-79-43 HS-803 668

DOT-TSC-NHTSA-79-48 HS-805 029

DOT-TSC-NHTSA-79-51 HS-805 030

DOT-TSC-UMTA-79-30 HS-026 679

DOT/RSPA/DPB-50/78-21 HS-026 758

DOT/RSPA/DPB/50-78/22 HS-026 759

E-9775 HS-026 704

FHWA-RD-78-203 HS-026 718

FHWA-RD-78-5 HS-026 582

FHWA-RD-78-81 HS-026 682

FHWA-RD-78-94 HS-026 737

GMR-2892 HS-026 570

MERADCOM-2260 HS-026 740

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NASA-RP-1024-Vol-2 HS-026 742

NASA-RP-1024-Vol-3 HS-026 743

NASA-TM-78993 HS-026 704

NBS-SP-480-33 HS-026 681

N79-17859 HS-026 704

ORNL/TM-6449 HS-026 581

PB-289 406 HS-026 677

PB-291 373 HS-026 759

PB-292 645 HS-026 718

PB-292 873 HS-026 758

PB-293 505 HS-026 703

PB-293 956 HS-026 702

S-479-Vol-1 HS-026 741

S-479-Vol-2 HS-026 742

S-479-Vol-3 HS-026 743

SAE-790037 HS-026 656

SAE-790038 HS-026 657

SAE-790039 HS-026 658

SAE-790040 HS-026 659

SAE-790045 HS-026 660

SAE-790046 HS-026 661

SAE-790047 HS-026 662

SAE-790048 HS-026 663

SAE-790049	HS-026 664
SAE-790056	HS-026 665
SAE-790076	HS-026 720
SAE-790078	HS-026 721
SAE-790079	HS-026 722
SAE-790081	HS-026 723
SAE-790082	HS-026 768
SAE-790084	HS-026 769
SAE-790086	HS-026 770
SAE-790088	HS-026 771
SAE-790089	HS-026 772
SAE-790090	HS-026 773
SAE-790281	HS-026 719
STI-TR-1113-1-I	HS-805 330
STI-TR-1114-1-Vol-1	HS-805 326
STI-TR-1114-1-Vol-2	HS-805 327
STI-TR-1114-1-Vol-3	HS-805 328
STI-TR-1114-1-Vol-4	HS-805 329
TRR-679	HS-026 745
TRR-681	HS-026 684
TRR-683	HS-026 724
TRR-687	HS-026 765
TRRL-SR-453	HS-026 592
TRRL-SR-455	HS-026 591
TRRL-SR-456	HS-026 593
TRRL-SR-462	HS-026 594
TRRL-SR-470	HS-026 595
UM-HSRI-77-18-1	HS-026 677
UM-HSRI-78-38	HS-805 177
UM-HSRI-79-10-I	HS-026 783
UM-HSRI-79-10-II	HS-026 784
UMTA-MA-06-0049-79-6	HS-026 683
UMTA-MA-06-0066-79-1	HS-026 679
UR-17	HS-805 325
ZN-6069-V-23-Vol-2	HS-805 302
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ZN-6069-V-32-2	HS-805 323
321-1	HS-805 051
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8316-78-106A	HS-805 169
8316-78-145A	HS-805 170
8316-78-170A	HS-805 167
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NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED B MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning t maximum amount of brake pedal force that automobile drive were able to sustain over a period of ten seconds. Subje were told to apply the brakes in the test car as they would i panic stop, and to exert as much force as possible on t pedal over the entire ten second test period. A total of 84 su jects were tested, including 42 males and 42 females. T results indicated that there is a wide distribution of valu which characterizes the pedal force that the subjects were a to generate. Male subjects produced generally higher forc than did females. Over half the women tested were unable exert more than 150 lbs. of force with either foot alone, b when both feet were applied to the pedal, force levels rose s nificantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, a included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflati pressure are deduced by assuming the bias tire as a composi structure of a bias-laminated, toroidal membrane shell a rigorously taking three displacement components into co sideration. The point collocation method is used to solve derived system of differential equations with variable coef cients. It is found that the lowest natural frequencies calc lated for two kinds of bias tire agree well with the correspon ing experimental results in a wide range of inflation pressur Results of the approximate analysis show that the influenc of the in-plane inertia forces on natural frequency may be co sidered small, but the influences of in-plane displacements a large, particularly on the natural frequency of the tire und low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-026 545

RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT

An experiment was conducted to investigate the effects of extraneous or deprived sensory input on ratings of ride quality. Fifty-four subjects were driven over each of nine different 365-meter road sections in groups of three and were asked to rate each section on the basis of ride comfort. The independent variables were sensory mode, condition, and road surface roughness. Auditory and visual sensory modes were employed, with the order of sensory mode counterbalanced. Trial runs on the road were divided into three blocks of three consecutive trials: control condition; extraneous stimuli condition; and deprived sensory input condition. The road surface ranged in condition from smooth to rough. Results demonstrated that ride quality ratings under the deprived sensory input condition were more accurate than other experimental conditions. Smooth road surfaces were rated better and rough road surfaces were rated worse than the control. Ratings in the extraneous stimuli condition were less accurate than the control condition and ratings of ride quality were uniformly rougher than the control for all road surfaces. It is recommended that further study include the vehicle as an important experimental variable.

by Michael L. Stewart; Robert K. Young; A. J. Healey
Publ: Ergonomics v22 n4 p399-405 (Apr 1979)
1979 ; 3refs
Summaries in French and German.
Availability: See publication

HS-026 786

CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS

Comments are presented relating to the Proposed Rulemaking in Docket No. 71-3a; Notice 4, which would amend Federal Motor Vehicle Safety Standard 111, Rearview Mirror Systems. Field of view, weather effects, alignment and adjustment, and convexity are addressed as they pertain to large trucks. An addendum to the original comments presents specific recommendations for modifications to the proposed rule. In terms of field of view, the rule should be revised to ensure that significant objects to the right of the truck cannot be hidden from view. This could be accomplished by defining an appropriate area or target object forward of the designated field YR which should be viewable by either direct or indirect means. Concerning alignment and adjustment, a provision similar to S5.3.1.6(b) needs to be developed for those trucks designed to meet S.5.3.2.1 through S.5.3.2.6. This would require that such vehicles also have an extended view of a designated target SR, or adjustment or locking features on right-hand mirrors. There seems no need to establish a maximum radius of curvature for convex mirrors (60 is mentioned in proposed rule). It is recommended that the proposed minimum radius of 20 in. for truck convex mirrors be reviewed to determine whether it might be increased to at least 30 in. The rule should contain provisions to ensure that ice or mist can be readily removed without the driver leaving his seat.

by Paul L. Olson; David V. Post
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-17 ; 1979 ; 15p
Sponsored by International Brotherhood of Teamsters.
Availability: Corporate author

HS-026 787

THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS

A survey of 200 random automobile paint chips with a standard forensic laboratory examination procedure (microscopic examination, solvent reactivity tests, instrumental analysis of organic constituents, and instrumental analysis of inorganic constituents) served to differentiate all samples. Specimen characteristics were tabulated throughout the examination to evaluate their frequency of occurrence in samples similar to those encountered in case work. Ninety-four percent of the samples were differentiated by microscopic examination and solvent reactivity tests. Of the remaining 6% that were undifferentiated, none of the paint chips had more than three layers. This observation leads to the conclusion that the probability of two paint chips originating from different sources is extremely remote when they have numerous layers (six or more) consistent in color, tint, type of finish, layer thickness, and reaction to acetone, sulfuric acid, and diphenylamine test solution. Ninety-seven percent of the samples were differentiated without the use of elemental analysis. For maximum differentiation capability, at least one instrumental analysis technique for organic components and one for elemental components should be incorporated into the analytical scheme when sample size permits. A review of the literature revealed the lack of frequency of occurrence studies for automobile paint evidence. Additional studies, similar to the present one, are being initiated to further assess the statistical value of this type of class evidence.

by S. G. Ryland; R. J. Kopec
Publ: Journal of Forensic Sciences v24 n1 p140-7 (Jan 1979)
1979 ; 12refs
Availability: See publication

HS-026 788

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD

The design developed by the Rockwell International Plastics Div. which allows the entire body of a pickup truck to be made of sheet molded compound fiberglass, thereby reducing the total weight by some 500 lb (227 kg), has not been enthusiastically adopted by engineers, partly because of the uncertainty of mileage standards for trucks in the 1982 and subsequent model years. The auto and truck makers are moving much more slowly in adding major plastic and aluminum parts because of the cost of these materials, and their need for extended equipment and facilities. Rockwell is now producing fiberglass hood-and-fender assemblies for Ford, Mack, International Harvester, and GMC Truck and Coach. These fiberglass components were adopted primarily because of corrosion resistance and lower initial tooling costs, with weight reduction a less important factor. Additional advantages include the ability to use six individual plastic pieces instead of 21 for a steel front end, a tilt feature for ease of maintenance, different styling lines, molding of storage boxes on the outside of the truck, and more frequent styling changes. A major obstacle to the construction of a large number of fiberglass pickups is the current lack of capacity (compression molding presses). Other Rockwell developments include several new or substantially modified components and systems recently introduced in its Truck Axle Div.: an SQHP tandem axle with aluminum carrier castings, a front axle in the 12,000 lb class with an aluminum beam, an FDS series of heavy-duty front driving axles, and an inter-axle differential locking system.

by Joseph M. Callahan; Michael K. McKann
Publ: Truck and Off-Highway Industries p64-9 (Jul-Aug 1979)
1979 ; 1ref
Availability: See publication

HS-026 789

OPTIONAL SAFETY DEVICES: HOW STRICT THE LIABILITY?

The development of legal principles is examined in a narrow area of a manufacturer's legal responsibility under strict liability principles: the duty to provide standard safety devices. The term "safety device" is used to apply to that class of articles which serves no functional purpose other than the protection of the reasonably foreseeable user (e.g. seat belts, locks, guards). The discussion is limited to those cases which deal with the extent of a manufacturer's duty to include a safety device, not those involving safety device effectiveness. Limited attention is given to whether the seller or the manufacturer is in a better position to anticipate foreseeable use; the focus is on the manufacturer's duty. It is concluded that if a product is inherently dangerous under all circumstances in the absence of an available safety device, justice demands that the device be incorporated as standard. If the product is dangerous only in the hands of a limited class of users or in a particular environment, logic suggests that the purchaser would be better able to anticipate such use and should have the burden of purchasing safety options made available by the manufacturer.

by Bruce D. Black
Publ: New Mexico Law Review v8 n2 p191-209 (Summer 1978)
1978 ; refs
Availability: See publication

HS-026 790

AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?

The question is explored whether common law liability should be imposed on the manufacturer of a car capable of excessive speed in cases where a person driving the car at such a speed injures a third party. The word "excessive" is used to describe the speed capacity beyond which liability for an accident resulting from speeding would attach to the manufacturer. The location of the point beyond which the speed is excessive would presumably reflect existing maximum posted speed limits, reasonable predictions as to future changes in those limits, data, energy consumption, and other relevant factors. The imposition of common law liability on the culpable manufacturer is examined, followed by the presentation of two alternative methods for imposing manufacturer liability: an act of Congress, and Federal administrative regulation. It is concluded that the manufacturer is as culpable as the speeding driver, and should be liable for the victim's injuries. If the courts fail to apply common law sanction, either the legislative or executive branch must act.

by Stephen H. Legomsky
Publ: Santa Clara Law Review v19 n1 p77-113 (Winter 1979)
1979 ; refs
Availability: See publication

HS-026 791

ROAD HYPNOSIS

Various forms of a phenomenon designated as "road hypnosi are described, as well as means to combat them. In some case drivers at night are hypnotized by the white lane stripes and a led off at the wrong exit. Other night driving situations involv a car backing up in the lane ahead but perceived by the a proaching driver as moving slowly in a forward direction. shifting within one's lane is called "box-in" or "sandwich" hy nosis, a form of claustrophobia. This occurs when the driver the center lane believes that the cars on either side are closin in on him. A similar form of "box-in" hypnosis involves th driver in the left lane next to a barrier/road divider in relatio to the car in the center lane. "Glare hypnosis" is the effect of a area on the pavement that appears wet and always moves wit the driver. "Giant hypnosis" involves the fear of being ove whelmed by a vehicle that is much larger than the affecte driver's vehicle. "Fatigue hypnosis" causes the field of driver alertness to become reduced becoming boxed-in to his own sel he begins to lose consciousness. Other forms of hypnosis a "windshield hypnosis," "straight line hypnosis" (continuing t drive straight when the road curves), "line hypnosis" (huggin the lane marker line), and "light hypnosis" (tendency to watc oncoming headlights).

by H.Gluck
Publ: California Highway Patrolman v43 n5 p6-7, 24-5, 27 (Jul 1979)
1979
Reprinted from Family Motor Coaching (Sep 1978).
Availability: See publication

HS-026 792

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS

The evolution of plastics technology in the U.S. auto industr began with the Ford Motor Co.'s development of a moldabl plastic sheet in the late 1930's. In 1971, the company displaye the country's first experimental plastic car body. In the earl 1950's several companies introduced limited-production sport cars with molded fiberglass bodies, one of which is still bein produced (the Chevrolet Corvette). Beginning in the mid-1950' vinyl upholstery became the first plastic material to be widel adopted for mass production by the auto industry. Corrosio protection and fuel economy improvements are the two impor tant factors in the use of plastics today. Of the nine material now used in cars, plastics rank third in total weight, toppe only by steel and iron. A considerable amount of plastic growth is expected, starting with the 1982 model year whe new body panels and structural components are approved. Th next areas of exploration include all-plastic windows, wheel and wheel covers, and fuel tanks. To the auto industry, plastic promise cost savings, weight reduction, energy conservatio and corrosion resistance. To the car buyer, they offer improve fuel economy, better design, and fewer maintenance problem

by Ed Janicki
Publ: California Highway Patrolman v43 n5 p12-3, 44-5, 50 (Jul 1979)
1979
Availability: See publication

HS-026 793

LEARNING TO LOVE THE PING [ENGINE KNOCK]

The most common cause of engine knock or pinging is the use of gasoline with an octane rating too low for the engine. The octane rating is simply a measure of the gasoline's ability to prevent knocking. The higher the compression ratio, the greater the efficiency of the engine, but also the greater tendency to knock. Refiners used to produce higher octane ratings by adding small amounts of knock-retardant chemicals, especially tetraethyl lead, but cars beginning with the 1975 models require unleaded gasoline because of their catalytic converters. Octane is designated as Research, Motor, or Research plus Motor divided by 2 (the rating required on gas pumps). Automakers believe that car owners should tolerate light, infrequent knock because it indicates maximum fuel economy from octane quality. Oil companies feel the same way, saying that a decrease in the octane rating of unleaded fuel nationwide could offer significant energy savings. Tips for the car owner in determining the lowest octane rating on which his car can run satisfactorily include learning to distinguish between minor pinging and damaging engine knock, having the car tuned, and checking the rating on the gas as it is bought and filling up successively with the next lower ratings if no knock occurs. Some general advice is that 1971-1974 model year cars should be able to use any grade of gasoline, cars built before the 1971 model year could develop problems with unleaded fuel, and 1975 models and later require unleaded fuel.

Publ: Driver v13 n2 p13-7 (Jul 1979)
1979
Availability: See publication

HS-026 794

THE GREAT AUTOMOTIVE DEBATE

A perspective is provided on the debate between the U.S. auto industry and the Federal government. American and British statistics are compared in terms of vehicles-in-use, cars per population, annual mileage of the average car, and annual average fuel consumption. The current energy shortage is cited in the context of U.S. gasoline consumption. The evolution of legislation affecting the automotive industry is reviewed, starting with the National Traffic and Motor Vehicle Safety Act and the Highway Safety Act of 1966, followed by the Clean Air Act of 1970 (amended in 1977), and the Energy Policy and Conservation Act of 1975. The growth of the Federal regulatory system is described, including the rulemaking and enforcement activities of the National Hwy. Traffic Safety Administration. The efforts of the Center for Auto Safety, a public interest group, are discussed. The cost effects of meeting safety, fuel economy, and emission standards on the auto industry and customer alike are considered. There remains the question of the American car-buying public's response to the auto industry's large investment in downsizing programs to meet government fuel economy regulations.

by Tony Howard
Publ: Autocar v151 n4315 p23-6 (21 Jul 1979)
1979 ; 2refs
At head of title: USA
Availability: See publication

HS-026 795

ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS].

Automotive brakes of today have two marked advantages over brakes of 20 years ago: they get rid of heat much more quickly, and they use linings whose frictional properties remain stable over a wide temperature range. No radical change is expected in the formulation of brake lining materials in the near future. The goal remains to produce a lining which will not wear out, which will apply a high frictional force for a low applying force, which will not grab on its initial application, and which will cause no brake squeal problems. The current trend is toward "harder" linings which wear better and remain more stable with temperature change, to give better fade resistance. The extra force needed to apply the brakes is provided by a servo. The brake designer has aided the lining manufacturer by designing brakes to keep temperatures at a tolerable level. For maintaining lower brake disc temperature, the best answer is to ventilate the disc by running air channels through the thicker part, or by simply making the disc bigger. Bigger-radius discs also reduce the braking effort required. More exotic solutions are water cooling and multiple discs of smaller diameter. Great advances are still being made in another brake component, the caliper assembly, not only in heat conduction but in design and contaminant protection. There is still no ready answer to the problem of brake squeal. Still to be realized is a practical system to store the energy created in braking in such a way that it could be used to reaccelerate the car. Much development work remains before antiskid brakes are generally available. Various brake systems are illustrated by drawings and photographs.

by Jeff Daniels
Publ: Autocar v151 n4315 p48-51 (21 Jul 1979)
1979
Availability: See publication

HS-026 796

COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]

Over the next few years, car castings and forgings will be reduced in size and weight, in some cases by materials substitution (e.g. aluminum or powdered steel for iron). Carbon and alloy-steel forge shops which make parts only for intermediate or full-size models are concerned about slumping sales in those segments, as are forge shops which make driveshaft and suspension components because of the trend toward front-wheel drive. The outlook for powdered-metal components seems brighter than for either iron castings or conventional steel forgings. Magnesium die castings are becoming competitive with those of zinc, and performance and durability of competitive plastic materials have also improved. Prospects of new automotive business for aluminum-casting companies are excellent. U.S. automakers plan to convert numerous components to the lighter cast aluminum over the next few years to meet stricter fuel economy standards. Iron castings will suffer more than other castings or forgings. Stainless steel is a potentially viable candidate for iron exhaust manifolds. Aluminum's cost, presently particularly sensitive, could strongly influence the auto industry's future materials programs. While the iron-castings content in cars is decreasing as aluminum castings increase, the forgings' iron content seems to be holding steady. Development of new, small, front-wheel-drive cars has eliminated some forgings, but has created demand for others. As more automotive components are reduced in size or redesigned to cut weight, the need for higher-strength forgings is likely to grow.

by Al Wrigley
Ward's Auto World v15 n7 p79-81 (Jul 1979)
1979 ; 2refs
At head of title: Special Report, Castings and Forgings.
Availability: See publication

HS-026 797

VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]

Under heavy pressure from higher-quality foreign-car competition and burdened with service complaints and product defect and reliability litigation, the U.S. auto industry is demanding that its thousands of suppliers meet much stricter product standards. Each automaker has a program to extract higher-quality shipments from suppliers, resulting in expense to suppliers of hundreds of millions of dollars. The General Motors supplier quality control program is called SPEAR (Source Performance Evaluating and Reporting), a systems approach, incorporating representatives from each of the company's divisions who serve on quality teams that inspect and audit vendor quality. The basis for Ford's quality push is a recent revision of "Q-101," the company's Quality Control Specification. Chrysler's quality program is viewed as an extension of its own system. American Motors conducts quality audits of its vendors through its Supplier Quality Assurance Dept. Federal-Mogul Corp., a major industry supplier, has instituted a high-level quality council which selects audit teams that frequently tour the company's 25 U.S. plants to conduct critical evaluations, to make quality-improvement recommendations, and to ensure that they are put into effect.

by J. Patrick Wright
Publ: Ward's Auto World v15 n7 p71-4 (Jul 1979)
1979 ; 1ref
Availability: See publication

HS-026 798

EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING

The effects of pavement marking and presence of other vehicles on the lateral positions of cars are reported for data collected by both fixed-site and moving-base observation techniques along suburban roads. Unobtrusive cameras were used for data collection to allow observations to be made on drivers who were unaware that they were being observed. The major dependent variable measured was lateral displacement of the car from the road centerline. The results of two studies indicate that there were reliable differences in the pattern of lane-keeping and lateral position between road sections that were similar in all respects except for the pavement delineation marking used. These data were also influenced by the presence of other vehicles. When drivers approach from opposite directions while in adjacent lanes, there is a systematic linear movement away from the road centerline which commences when the cars are separated in time by between 2.5 and 4 sec, and increases as the gap between the vehicles decreases. The time at which movement commences appears to depend on the delineation marking used. Use of direction indicators by drivers was shown to depend on whether lanes were defined by pavement marking.

by Thomas J. Triggs; Philippa H. Wisdom
Monash Univ., Human Factors Group, Clayton, Vic. 3168, Australia
Rept. No. HFR-10 ; 1979 ; 41p 12refs
Sponsored by commonwealth Dept. of Transport.
Availability: Road Safety Information Service, G.P.O. Box 1839Q, Melbourne, Vic. 3001, Australia.

HS-026 799

AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS

The collision coverage loss experience for car size groups, bo
style subgroups, and some individual vehicle series of 19
model year passenger cars during their first six months of ava
ability is described, based on data supplied by seven insure
(Aetna Life and Casualty, Allstate, Kemper, Nationwide, Pr
dential, State Farm, and Travelers). The initial collision cove
age losses for the 1979 models increased over the 1978 mod
year results from the same calendar period. The overall clai
frequency was unchanged but the overall average loss payme
and average loss payment per insured vehicle year increased
9%. Two of the four car size groups (subcompacts and co
pacts) had higher claim frequencies for the 1979 models than t
1978 models for the same calendar period and the other tw
size groups (intermediates and full size) had lower claim fr
quencies. All four size groups for 1979 models had higher ave
age loss payment amounts and three of the four had high
average loss payments per insured vehicle year than the 19
models. For the 1979 models, average loss payments per insure
vehicle year for three body style subgroups (regular two-do
models, regular four-door models, and sports or special
models) generally decreased with increasing wheelbase for su
compacts, compacts, and intermediates. In each car size grou
the average loss payments per insured vehicle year were highe
for the sports or specialty models and lowest for the regul
four-door models. Average loss payments per insured vehic
year, claim frequencies, and average loss payments per claim f
individual 1979 series varied considerably. There was more th
a fourfold variation in the range of average loss payments p
insured vehicle year. The claim frequencies varied by a fact
of more than two, and average loss payments per claim varie
from more than $1200 to less than $800. A list of other researc
reports by the Hwy. Data Loss Inst. is provided.

Highway Loss Data Inst., Watergate 600, Washington, D.C. 20037
Rept. No. HLDI-R79-1 ; 1979 ; 51p refs
Availability: Corporate author

HS-026 800

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS

The frequencies of insurance claims for injuries to occupants o
two groups of Volkswagen Rabbits, those with automatic be
systems and those with manual belt systems, are compared usin
"no-fault" personal injury protection and medical payments in
surance experience for three model years (1975, 1976, and 1977
Data were supplied by five insurers: Aetna Life and Casualty
Allstate, Liberty Mutual, Nationwide, and State Farm. Als
presented are the results of a survey of the medical informatio
in the injury claim files. Under the personal injury protectio

("no-fault") coverages, the VW Rabbits sold with automatic belts had slightly lower overall injury claim frequencies than those sold with manual belts. For the medical payments coverages, which are somewhat more limited, there were no discernible claim frequency differences between the two groups of cars. The results of the survey of the claim files indicate that in frontal crashes there were 17% fewer injuries to the occupants of VW Rabbits sold with automatic belts, and that the frequency of head injuries was 43% lower. In side and other crash types, the frequency of occupant injuries was about equal in the two groups. These results are important, since frontal crashes in general and head injuries in particular cause the majority of motor occupant deaths. A list of other research reports by the Hwy. Loss Data Inst. is provided.

Highway Loss Data Inst., Watergate 600, Washington, D.C. 20037
Rept. No. HLDI-A-10 ; 1979 ; 29p refs
Availability: Corporate author

HS-026 801

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS

The model year-to-model year consistency of the collision coverage loss experience results of specific compact and subcompact cars, 1975 to 1978 models, is documented, based on data supplied by eight insurers (Aetna Life and Casualty, Allstate, Kemper, Liberty Mutual, Nationwide, Prudential, State Farm, and Travelers). The collision loss experience of most specific cars remained consistently better, worse, or close to average regardless of the model year in which they were produced. Among both compacts and subcompacts, the relative rankings of cars in the same car size group, based on average loss payment per insured vehicle year, were essentially the same in each successive model year. The data show that if a car ranks better than another in its collision loss experience in one model year, most likely it will rank better in other model years. In each model year, individual four-door models generally had lower average loss payments per insured vehicle year, and hence ranked better, than the corresponding two-door model of the same kinds of vehicles. The relative claim frequencies and average loss payments per claim for individual cars were less variable across model years than the relative average loss payments per insured vehicle year. A list of other research reports by the Hwy. Loss Data Inst. is provided.

Highway Loss Data Inst., Watergate 600, Washington, D.C. 20037
Rept. No. HLDI-A-11 ; 1979 ; 33p refs
Availability: Corporate author

HS-026 802

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)

Results are presented for 26 foreign cars, typical of all makes and models, which were driven by the Country Touring Club of Kallis, Switzerland to evaluate their performance on the frozen, snow-covered Silser Lake and in the Albula Pass. All driving was done with steel-belted tires, and the cars were evaluated under normal and heavy loads. Each car was driven by ten drivers; their subjective evaluation and the elapsed time for completing the test courses were used to rank the cars. The superiority of front- vs. rear-wheel drive was demonstrated by a car's ability to negotiate curves on the frozen lake. The one rear-wheel drive car which was an exception was the Alfetta 1.8, a car with the gears located on the rear axle for optimum weight distribution of the axles. The mountain course was a curving, 1400 m road with a 170 m change in altitude, and grades up to 14%. Front-wheel-drive cars performed well when unloaded, but with luggage on board, they were unable to handle the steep grades. With a full load, only the Audi 100 LS and Citroen CX 2000 reached the top easily. Of the rear-wheel-drive cars, the Alfetta had no problems in the mountain test, whether empty or loaded. For the other rear-wheel-drive cars, the performance varied widely. The tests clearly demonstrated that an automatic transmission is very beneficial in mountain driving, particularly when starting up grades. Overall, on both the handling and mountain courses, the Audi 100, Alfetta, Fiat x 1/9, and Citroen CX performed well. The Volkswagen "bug", with rear engine and large wheels, was superior to many new designs. The following cars were less suited for winter driving: Ford Escort 1.3, Ford Taunus 196, Mercedes 280 SE (without automatic transmission), Opel Kadett 1.2, and Toyota Corolla 1200. The Range Rover, with four-wheel drive, was in a class by itself. Some winter driving tips are provided, such as, having good tires and brakes, and distributing passenger and luggage load appropriately.

Publ: Touring Test n45 (1976)
1976 ; 11p
Text in English, French, and German (originals 2p; translation 7p)
Availability: Reference copy only

HS-026 803

REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS

The pavement marking industry has made a considerable contribution to highway safety by developing fast-drying, highly-reflectorized marking materials, and equipment for their precise application. A pavement marking industry study together with Dept. of Transportation studies demonstrate the importance of proper roadway striping in terms of lives saved, injuries prevented, and economic losses avoided. Reflectorized edgelines alone can be expected to reduce accidents by more than 10%, and the addition of centerlines can effect at least a 20% reduction. Safety experts stress that roadway striping should be included in all highway/street programs with a goal of providing 100% lining; regular restriping schedules are also necessary. Striping equipment is now available to handle virtually any type of pavement marking assignment. Industry-conducted tests established that adding reflectorized centerlines and edgelines to 500 mi of Federal-aid and rural state secondary systems can prevent at least 3 deaths, 21 severe injuries, and 39 other injuries per year.

Publ: Better Roads v49 n8 p15, 32 (Aug 1979)
1979 ; 1ref
Availability: See publication

HS-026 804

IMPACT ATTENUATORS SAVE LIVES, VEHICLES

To establish traffic flow together with safety during the replacement of a median strip on the Biloxi (Miss.) Bay Bridge, Con

Plex Corp. used two Truck Mounted Attenuators (TMA's) and one G-R-E-A-T CZ (Construction Zone Guardrail Energy Absorbing Terminal), both manufactured by Energy Absorption Systems, Inc. Also used were arrow signs, flagpersons, cones, and plastic channelizing sandbag-weighted reflectorized barrels. During construction work, the TMA's with their towing trucks were deployed on both sides of the median so that workers were protected from traffic (in the outer two lanes) in either direction. At the close of each workday, the G-R-E-A-T CZ impact attenuator was set up at the lead end of the newly poured section of median barrier. Con Plex reported that the portability of the energy-absorbing units enabled the company to use high-speed techniques and the overall nighttime safety made its procedures acceptable to the state. A reduction of two months in the original program time was realized. Crash cushions, or impact attenuators, have been making an increasingly important contribution to highway safety, according to the Dept. of Transportation. In addition to use on median barriers, they provide protection against obstructions in gores, massive sign supports, and bridge abutments. The Federal Hwy. Administration indicates that for every dollar spent on impact attenuators, the road users realize $123.80 in benefits. Other devices developed by Energy Absorption Systems include Hi-Dro Cushion, Hi-Dri Cushion, and Energite System attenuators.

Publ: Better Roads v49 n8 p16-7 (Aug 1979)
1979 ; 1ref
Availability: See publication

HS-026 805

HIGHWAY DEATHS SIGNAL 'EPIDEMIC'

The National Hwy. Traffic Safety Administration (NHTSA) reports 10,217 highway deaths from Jan through Mar 1979, the fatality rate running 14% ahead of 1978. Through May, the death toll was only 8% ahead, according to a Newhouse News Service report. According to NHTSA, the western and southwestern U.S. have fared the worst since 1975, indicating a 28% increase in traffic deaths; midwestern and southern figures went up by 10% and 7%, respectively; only the northeast rate was unchanged. NHTSA also reports an increase in fatalities per million miles between 1977 and 1978 for the first time since the 1966 safety program began. National Safety Council statistics list fatalities per million vehicle miles of travel for each state in 1978; they show Nevada with the highest percentage at 6.2, and the District of Columbia with the lowest at 1.7. Traffic Safety magazine reports that 16 states had decreases in fatalities during Jan and Feb 1979, with Alaska heading the list. A National Transportation Safety Board statistical comparison of 1977 and 1978 fatalities according to vehicle type indicates passenger car fatalities of 27,535 in 1977 and 28,120 in 1978. The Wyoming Hwy. Dept. credits various safety programs for the state's reduction in highway fatalities. Wisconsin transportation officials cite the disproportionate number of deaths among young drivers. The chairman of The Road Information Program relates the current decrease in highway deaths to the fuel crisis. Separate sections mention the efficient use of highway safety funds by the Iowa Dept. of Transportation, the lowest fatality rate in 20 years for 1978 on the New York State Thruway, and an increase of more than 20% for traffic accidents on Indian reservations in Arizona during 1978.

Publ: Better Roads v49 n8 p18-9 (Aug 1979)
1979 ; 1ref
Availability: See publication

HS-026 806

FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING

Forces that the bicyclist applies to the pedals, saddle, and han
dlebars during speeding, hill climbing, and starting were estimat
ed from cine film records using elementary mechanics. Th
results were compared with force measurements obtained fro
an instrumented pedal. Differences between estimated and mea
ured values of pedal loads were always less than 20%. It wa
estimated that a rider traveling at a steady speed of 37 kph o
level ground, and developing a tractive power of 255 W, exer
ed a maximum push on the pedal of 310 N, about 50% of h
body weight, and that about 50% of his weight was supporte
by the saddle. Toppling sideways was prevented by pulling u
one handlebar (71 N) and pushing down on the other (101 N
The maximum pedal load for a seated rider was recorded in a
indoor experiment when a power of 770 W was dissipated in
dynamometer. The maximum push applied to the pedals wa
then approximately equal to the rider's body weight (570 N
the maximum pull on the rear pedal being less than 100 N.
rider starting on level ground and accelerating at 2.6 m/sq s
was estimated to apply a force of 1448 N or more than twice h
body weight to the forward pedal and a pull of 367 N to t
rear pedal. The need to apply a large net pull on the handleba
and to counteract the large toppling moments produced by bo
pedals, in this case requires a pull of 714 N on one handleba
together with a push of 293 N. A rider climbing a one in t
incline at 26 kph, and developing a power output of 665 W, w
estimated to produce a maximum pedal force of 732 N, sligh
in excess of body weight. The pull on the rear pedal was ve
small and the net pull on the handlebars only 54 N, but the pu
on the handlebars was 235 N and the pull was 181 N. T
largest pedal forces recorded were for starting on an incli
when three riders each applied maximum pedal force of th
times body weight. Tilting the bicycle does not seem to of
great advantages.

by P. D. Soden; B. A. Adeyefa
Publ: Journal of Biomechanics v12 n7 p527-41 (1979)
1979 ; 11refs
Availability: See publication

HS-026 807

DESIGN FOR ECONOMY [AUTOMOBILE ENGINES]

Future requirements for simpler and more efficient engi
could result in a return to long-stroke design to improve eng
economy. For a fairly wide range of engines, a standard form
expresses mechanical losses with reasonable accuracy: F
plus 0.15 N plus 0.05 N squared, where N is engine speed
1000 rpm. The slower running engine is likely to be m
economical. Using this formula, ways are suggested in wh
economy engine design should develop. The 1-liter engine
1985 is envisioned as being a transverse overhead valve, th
cylinder unit with a bore of 70 mm and a stroke of 86 mm
993 cc), hopefully developing somewhat more than 40 bh
4000 rpm, with good emissions performance. with a low ta
speed for peak power, combustion will have to be highly
cient. Part of that extra efficiency will have to be sought
higher compression ratio (CR). The answer to running eng
at higher CR'S on 95-octane fuel lies in electronic engine
trol systems. Engine design alone has the potential for a
saving in fuel consumption. Some engines are illustrated by
away drawings and photographs.

by H. W. Barnes-Moss
Publ: Autocar v151 n4316 p34-6 (4 Aug 1979)
Rept. No. IMechE-C343 ; 1979
Availability: See publication

HS-026 808

EFFECTS OF TRANSPORTATION ON THE COMMUNITY

Nine papers are compiled which individually discuss the following topics: public attitudes toward automobile-restricted streets in Philadelphia and Trenton, density as a determinant of highway impacts, attraction of Interstate radial freeway corridors for new office sites, neighborhood quality-of-life indicator model for highway impact assessment, applications of variable work hours in the Twin Cities metropolitan area, analytical process for coupling economic development with multimodal and intermodal transportation improvements, regulatory implications of individual reactions to road traffic noise, effectiveness of shielding in reducing adverse impacts of highway traffic noise, and effects of highway noise on residential property values.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-686 ; 1978 ; 49p refs
Includes HS-026 809--HS-026 811.
Availability: TRB $3.00

HS-026 809

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE

Three categories of criteria for setting acceptable levels of road traffic noise are noise impacts (i.e. activity interference and effects on health), attitudes toward noise, and actions taken to reduce the impact of noise (e.g. complaints). The rationale for selecting criteria needs to be based on careful empirical analysis of two sets of relations: the relations among the plausible criteria, and the relations between the criteria and noise measurements. The first set of relations is examined by using questionnaire data collected at 37 sites adjacent to highways in southern Ontario, Canada. The results show significant but relatively weak links between impacts and attitudes and between attitudes and actions. The analysis results question the use of activity interference measures, and particularly speech interference, as a criterion for setting standards, and confirm the inadequacy of regulating against traffic noise on the basis of complaint action.

by S. Martin Taylor; Fred L. Hall; Meric Gertler
McMaster Univ., Hamilton, Ont., Canada; University of California, Berkeley, Calif.
Publ: HS-026 808 (TRR-686), "Effects of Transportation on the Community," Washington, D.C., 1978 p27-33
1978 ; 14refs
Supported by Ontario Ministry of the Environment, and Canada Council. Sponsored by the Com. on Transportation-Related Noise.
Availability: In HS-026 808

HS-026 810

EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE

Some studies have suggested that the psychological effect of noise barriers or other forms of shielding between residential areas and noisy roadways is greater than their acoustical effect. This suggestion was tested by using home interview data from five pairs of residential sites in Ontario, Canada. The two sites that made up each pair experienced the same noise level at dwellings but had different types of shielding or barriers. It appears that there is no psychological effect on attitudes toward road traffic noise specifically, but that there is an effect for attitudes toward overall community noise. This psychological effect appears to be negative for solid noise barriers, low for single rows of trees, and highest for a row or rows of intervening housing.

by Fred L. Hall; Susan Birnie; S. Martin Taylor
McMaster Univ., Hamilton, Ont., Canada
Publ: HS-026 808 (TRR-686), "Effects of Transportation on the Community," Washington, D.C., 1978 p33-8
1978 ; 14refs
Supported by Ontario Ministry of the Environment, Canada Council, and National Res. Council of Canada. Sponsored by the Com. on Transportation-Related Noise.
Availability: In HS-026 808

HS-026 811

EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES

Previous studies of highway noise have shown an effect on the price of housing that seems to vary considerably with location. In this analysis, six sites in Ontario, Canada, that consist of similar housing in parallel rows adjacent to major roads were identified, and data on real estate transactions and noise levels were collected. Analysis of variance indicated that there were significant differences in price between rows of houses only at the two noisiest sites. Consequently, multiple regression analysis was performed for two subsets of the sites based on noise level. The results show that at very noisy locations (daytime Leq (average sound level) of 73 dBA or higher) noise is strongly related to differences in housing prices and is valued at approximately $650/dB. At less noisy sites (daytime Leq less than 70 dBA), noise is not significantly related to differences in housing prices. These results suggest that some noise impacts are not a linear function of sound level, and that noise reduction at very noisy locations is more important than at less noisy ones.

by Fred L. Hall; Barbara E. Breston; S. Martin Taylor
McMaster Univ., Hamilton, Ont., Canada
Publ: HS-026 808 (TRR-686), "Effects of Transportation on the Community," Washington, D.C., 1978 p38-43
1978 ; 11refs
Supported by Ontario Ministry of the Environment, Canada Council, and National Res. Council of Canada. Sponsored by the Com. on Transportation-Related Noise.
Availability: In HS-026 808

HS-026 812

TEST OF SELF-STEERING TRAILER AXLES

In Ontario, Canada, self-steering trailer axles have found application by operators wanting to reduce tire wear of units with wide axle spread developed to take advantage of axle load regulations. By aligning with the turn, these axles can reduce both tire scrub and trailer offtracking. A test program was undertaken to ensure that these advantages are not achieved at the cost of reduced trailer stability and safety in steering and braking maneuvers at normal speeds. A triaxle van, equipped with two self-steering axle systems (one single axle, one bogie) was tested as a semitrailer in both low- and high-speed maneuvers, and compared with a conventional tractor-semitrailer. In low-speed cornering, both single axle and bogie self-steering systems reduced tire scrub. Bogie steering reduced trailer offtracking but the single axle (in its location as lead axle) did not. In high-speed braking and maneuvering tests (at speeds of 50 to 60 kph), one serious instability was observed. In a lane change with moderate braking, the lead wheels on the bogie locked up and slid. Under these conditions the bogie was unable to track behind the tractor but continued in the original lane. The manufacturer (Auto Steering Trailers, Ltd.) has a probable remedy for this problem. Single- and double-lane changes on wet asphalt (with and without braking) showed that the bogie system otherwise affected maximum maneuver speed by plus/minus 7%. Overall performance was slightly worse than with the bogie not steering. The single axle had a slightly beneficial effect, if any, on stability. Its potential as a replacement for a lift axle is not compromised.

by A. M. Billing
Ontario Ministry of Transportation and Communications, Comercial Vehicle Operations and Safety, Ont., Canada
Rept. No. CVOS-TR-79-02 ; 1979 ; 68p 7refs
Availability: Corporate author

HS-026 813

WYOMING TRAFFIC ACCIDENT FACTS 1978

Traffic accident statistics for Wyoming in 1978 are compiled under the following sections: general statistics, where accidents occur, type of vehicles, type of accidents, seat belt usage, when accidents occur, driver and environment, drivers and casualties, teenage drivers, motorcycles, school buses, trucks, and city accidents. A spot map of fatal motor vehicle accidents is provided, as well as definitions of special terms used in the tables. The statistics were complied from reports submitted by individuals involved in accidents, investigating officers from city police departments, sheriff offices, and the Wyoming Hwy. Patrol. For the year 1978, a total of 17,775 accidents occurred on Wyoming's road system, a 15% increase over 1977. In these accidents, 7404 persons were injured and 241 persons killed (the fatal accident rate decreased 6.8%). Traffic accidents resulted in an $84 million economic loss (estimated by National Safety Council).

Wyoming Hwy. Dept., Safety Improvement Section, P.O. Box 1708, Cheyenne, Wyo. 82001
1979 ; 57p 2refs
Availability: Wyoming Highway Dept., Highway Safety Branch, P.O. Box 1708, Cheyenne, Wyo. 82001, $2.00

HS-026 814

SELECTING TRANSMISSIONS FOR MOBILE EQUIPMENT

The energy crisis and higher operating costs are creating a demand for more refined transmissions in construction machinery, off-road trucks, and farm equipment. As a result, new powertrains weigh less, are more efficient, and draw upon the latest developments in technologies ranging from metallurgy to electronics. The function of the transmission is discussed, par-
ticularly matching engine torque to the torque demand
road and operating conditions. The most common trans
in mobile equipment are illustrated and described (manu
matic, powershift, and hydrostatic), as well as innova
transmissions (metal-belt drive, traction drive, hydrome
drive). The reduction of transmission component weig
stituting materials, use of stamped components), and th
computer modeling to optimize matching of powertrain
nents are considered. Greater interest is reported in
clutches for eliminating converter slip and in variable-
torque converters for making machines more versatile.
troduction of microprocessors into transmission control
prove accuracy and operating convenience is discussed.
static and electromechanical wheel drives in mobile eq
to provide design latitudes not possible with convention
are described and illustrated.

by Myron Seneczko
Publ: Machine Design v51 n18 p86-92 (9 Aug 1979)
1979
Portion of technical background material was provided
Society of Automotive Engineers.
Availability: See publication

HS-026 815

CORRECTION OF LICENSE PLATE SURVEYS SPURIOUS MATCHES

To economize and to keep errors of recording in che
common practice in license plate surveys to record onl
of the license plate code. License plate records collecte
points in time or space are then searched for matching
Due to comparison of partial license plate codes, some
occur between records belonging to different vehic
probability distribution of such spurious matches is der
the importance of the phenomenon is explored. A proc
given for the correction of survey results and the asses
the confidence limits for corrected results. The proc
supported by appropriate graphs and tables.

by Ezra Hauer
A8158
Publ: Transportion Research v13A n2 p71-8 (1979)
1979 ; 5refs
Sponsored by National Res. Council, Canada.
Availability: See publication

HS-026 816

LIFE IN THE SLOW LINE [LINES AT GASOL STATIONS]

Photographs and their captions illustrate scenes reflecti
gasoline shortage and increased fuel prices in the U
lines at gas stations, cars being pushed or left by the si
road after running out of fuel, higher prices at the
stations permanently closed, no traffic on the highway
tisements selling recreational vehicles at bargain pri
people shopping for smaller cars. Some hints to help th
ist through 20- or 60-minute waits in the gas line inclu
about energy-saving measures (e.g. van pooling), make
ten new ways to save gas or concentrate on how to
trips for greater efficiency per gallon, use the tire
check tire pressures, consider the alternatives to waiting
line (e.g. carpooling), and mingle with fellow motorists.

Publ: Driver p18-21 (Jul 1979)
1979
Availability: See publication

HS-026 818

CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS

The Swedish State Commission proposes the creation of a Child Safety Commission within the Dept. of Health and Social Welfare which would consist of representatives from the main political parties and from the five state authorities mainly involved in child safety issues (social welfare authorities, the schools, house planning, traffic security, and consumer safety). The central organization would be at the local level, with childhood safety advisers employed by the municipalities and paid by the government to coordinate accident-prevention activities. The State Commission also recommends a system for the registration of childhood accidents as an aid to the development of countermeasures. The Commission supports public education (via the mass media) to provide information on child development, accident risk, and preventive measures. The Commission also recommends the following: retroactive application of childhood safety rules in Swedish Building Regulations; means to eliminate dangerous products from the marketplace at an early stage; children under the age of 12 not to be held responsible for damages due to traffic accidents; implementation of efficient societal approaches to reduce fatal traffic accidents; accident prevention education as a part of regular schoolwork; stimulation of continued work by voluntary organizations to promote childhood safety; and promotion of active participation by parents and others to achieve a safer environment for children. The costs of these proposals would be 17 million Swedish crowns per year.

by Kerstin Backstrom
Publ: Voice of the Pedestrian v11 p21-3 (Spring 1979)
1979
Legal size pages. Summary of paper presented at seminar, Cologne, 23-24 Mar 1979.
Availability: See publication

HS-026 819

PEDESTRIAN ACCIDENTS

Among the predisposing factors of child pedestrians to accidents are the child's idiosyncratic understanding, inability to make complex judgments about distance and speed, inefficient peripheral vision and poor directional hearing, and lack of attention. Britain continues to have the highest rate of child pedestrian casualties in Europe, especially in the 5-9 age group. Safety education for children may not greatly affect their immediate safety but does lay a foundation for the future; the lessons need to be practical. In the protection of children from traffic accidents, the most important element is supervision. Children must also be given a safer environment, such as more protected or less dangerous play areas. Lowered speeds in residential areas (for example, by narrowing road width) would be beneficial. Drivers must be better educated about the behavior of child pedestrians, and their legal responsibility redefined so that the pedestrian has priority on certain residential roads. Emotional problems, physical ailments, incoordination, and lack of initiative are many factors making a child more accident-prone. Young and middle-aged adults are relatively safe pedestrains, unless they are drunk. Elderly pedestrians present problems similar to those of children. Vehicle design improvements such as energy-absorbing materials, "collapse" features, lower bumpers, and better hood design, can improve pedestrian protection. The pedestrian's interest must be given priority in city planning, exposure statistics are needed, and pedestrians themselves must behave responsibly.

Publ: Voice of the Pedestrian v11 p57-9 (Spring 1979)
1979 ; 32refs
At head of title: A Modern Epidemic. Reprinted from British Medical Journal v1 p101-4 (1979). Legal-size pages.
Availability: See publication

HS-026 820

HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS

The problem of road accident involvement of children is discussed in terms of mortality and morbidity statistics for the U.K., and the importance of child growth, development, and behavior as accident factors is addressed. The following statistics are tabulated and discussed· total and accidental deaths by age groups (1-4, 5-9, 10-14) and years (1951, 1966, 1971, 1974); total deaths from accidents, and road accident deaths by years (1967, 1976) for children; death rates (per 100,000 population) by social class in age groups, 1959-1963; and killed, seriously injured, and slightly injured children by road user type (pedestrian, cyclist, passenger in vehicle, driver or rider on motorcycle), England and Wales, 1976. Discussion of child development in terms of the traffic environment covers height, hearing, vision, divided concentration, right-left discrimination, and understanding of road signs and of words used in relation to traffic. Statistics are graphed and discussed concerning the sex differences of children aged 0 to 15 who were fatal and serious casualties in pedestrian and cycle accidents during 1973-1975, and risk per road crossing for boys and girls aged 5-10 years. The protection of children as passengers and pedestrians is addressed in terms of safer vehicle design, and use of child restraints, as well as the influence of bicycle design on cyclist accidents. In addition to driver, vehicle, and environmental factors, the role of the emotional and physical condition of a child pedestrian in accident causation is emphasized. The importance of developmental and psychosocial factors in childhood accidents, and the need for adults to know of children's limitations in traffic are stressed. The increased involvement of the pediatrician in this aspect of preventive medicine is strongly advocated.

by R. H. Jackson
Publ: Voice of the pedestrian v11 p60-5 (Spring 1979)
1979 ; 32refs
Legal-size pages. Reprinted from Archives of Disease in Childhood v53 n10 p807-13 (Oct 1978).
Availability: See publication

HS-026 821

SKANDIA REPORT 3. "UNPROTECTED ROAD USERS"

Using 1000 cases from the files of the Skandia Insurance Co. (Stockholm, Sweden) for the 1969-1970 period, an analysis was made, the first of its kind, of the particular problems of all age groups as "unprotected road users" (i.e. pedestrians, cyclists, moped riders). The behavior of each of the victims just before they became involved in the traffic accident was investigated. The conclusion from the analysis agrees with that of the first two Skandia reports (on traffic accidents involving children): that the high toll of traffic accidents is caused by lack of consideration by motorists to the road users' different ages and psychological ability to react. The motorist generally expects that all unprotected road users know the relevant rules for survival and apply them at all times. No consideration is given to their individual development or age, two factors which are critically important where children and the elderly are concerned (the two most affected age groups). Better traffic education is the essential foundation of a better traffic environment. Instruction should be given to all teachers and to day-care center personnel, special traffic instructor positions should be established at all schools, and driver education should include information on human behavior in traffic. Improvements in crosswalks could include setting signs about 20 m before the crosswalk, improving lighting, locating bus stops on the far side of intersections, and possibly using different kinds of crosswalk markings. A Traffic Psychology position at the university level is recommended.

by Diana Wormuth
Publ: Voice of the Pedestrian v11 p66-9 (Spring 1979)
1979
Legal-size pages. Reprinted from "Oss emellan International," Skandia Insurance Co. Ltd., S-103 50 Stockholm, Sweden.
Availability: See publication

HS-026 822

RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]

The role of the U.S. in providing a barrier-free environment for handicapped persons is reviewed. Several State Handicapped or Accessibility Standards incorporate an holistic approach to design that ensures that solving one set of problems does not result in creating more problems for other people. With the 1973 Rehabilitation Act, the needs of most disabled people are beginning to be fully understood and changes are being made nationwide. By 1980, the law requires that schools, universities, and hospitals be fully accessible to all handicapped people including children. Most institutions have already evaluated their facilities in such terms. "Specifications for Making Buildings Accessible to the Handicapped" (American National Standards Inst. A117.1) have been under revision for nearly four years. Many states have meanwhile developed their own handicapped codes. Another Federal law (P.L. 94-147, 1975) requires a free, appropriate public education for all handicapped children. The new Federal and state laws address both the public and private sectors. While greater attention has been paid to buildings, the needs of the disabled in the exterior environment have gradually been brought into focus in recent years. Main problems faced by handicapped persons in the exterior environment include: systemwide mobility barriers (absence of usable pedestrian ways, inaccessible transportation system); inadequate component segments of the pedestrian system (e.g. time available to cross street, presence of rest areas); inadequate elements of the pedestrian system (ramps, handrails, surface materials), and other factors (turning traffic, crime, public awareness). The answer to these problems lies with a priority network of pedestrian routes connected to form a continuous system which can gradually be expanded, and interfacing with other accessible systems. The nature of districts must be analyzed and priority given to those used more by the elderly and handicapped.

by Michael Anthony Jones
Publ: Voice of the Pedestrian v11 p73-80 (Spring 1979)
1979 ; refs
Legal-size pages.
Availability: See publication

HS-026 823

HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS

Historical trends in childhood mortality and accidental dea
rates in Sweden are discussed, including consideration of unr
liability or lack of data. To gain insight into the childhoo
accident picture, it is stated that reliance must be placed
special epidemiological studies. Four such childhood accide
surveys are reported, each conducted in a different area
Sweden. Various studies (particularly Swedish) on the involv
ment of children in road traffic accidents are reviewed: ch
dren's different reactions in traffic, the traffic environment a
accident causation, bicycle involvement, child restraints, a
residual symptoms among injured children. Studies of childho
drowning and poisoning accidents are also reviewed. The dif
culty in establishing a relationship among environmental hazar
accident proneness, adequacy of supervision, and safety educ
tion is addressed. Methodological problems in childhood ac
dent research are discussed: determination of exposure to ri
factors, selection (representativeness of data), inhomogeneo
result variable ("childhood accident" is not a single, unifor
concept; each accident type has its own epidemiology), the lo
frequency factor (difficulty in collecting enough data for ea
type of accident for a meaningful statistical analysis), equilib
um among accident factors (environment, accident pronene
supervision, education). Also discussed are determination of p
ventive measures, and Swedish laws for the protection of ch
dren against accidents. Media education campaigns and orga
zations concerned with the prevention of childhood accidents
Sweden are described. Some priorities for childhood accide
prevention include priority to accidents with high rish of seve
injury (e.g. road accidents, drowning), improvement of t
normal environment of children, education for all parents co
cerning hazards and improved collective supervision of ch
dren, and establishment of a form of simple, continuous registr
tion of childhood accidents. Research needs include in-dep
studies of accidents, and evaluation studies of countermeasur

by Lars H. Gustafsson
Publ: Voice of the Pedestrian v11 p95-112 (Spring 1979)
1979
Legal-size pages. A report from the research survey "Changin
Health Conditions and Individual Health," Com. for Future
Oriented Res.
Availability: See publication

HS-026 824

THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN

A survey of nearly 300 preschools in Sweden attended by a
proximately 100,000 children under six years of age was co
ducted by sending questionnaires to preschool personnel (
sponse rate of 95%) and to the children's parents (70%
sponse) to obtain information about the preschool traffic en
ronment and the child's mode of transportation and route t
from preschool. Time of year as well as the effect of prescho
geographical location were studied. A total of 19 accidents a
near-accidents was also studied for the Jan 1977 to May 19
period. For 15% and 25% of the preschools, respectively, t
traffic environment and the route to school were consider
hazardous. Dangerous traffic environment factors included la
ing or poor quality fences, lack of warning signs, obstruct
vision at entranceways, and excessive speed on roads around t
preschool. Lack of proper pedestrian and bicycle paths prese
ed safety problems for the large group of children walking a
bicycling to preschool. In nearly all of the preschools (96%),

least some traffic education was said to be given, although the form and extent varied greatly. Parents felt that most of the children's traffic education was provided at home. Nearly half of the parents used materials from "The Children's Traffic Club," a private organization active throughout Sweden in traffic safety education for children, providing "indoor" materials such as records and cutout materials, and some training exercises in actual traffic situations.

by Peter W. Arnberg
Publ: Voice of the Pedestrian v11 p117-34 (Spring 1979)
1979 ; 3refs
Legal-size pages. Based on National Swedish Road and Traffic Res. Inst. (VTI) report "Trafikmiljo for barn i forskola," by P. W. Arnberg, G. Derefeldt, and S. Sandels. Sponsored by Dept. of Social Welfare (Sweden).
Availability: See publication

HS-026 825

SEARCHLIGHT ON SAFETY [MOTORCYCLE HELMET USE]

A National Hwy. Traffic Safety Administration (NHTSA) study comparing the number of motorcycle fatalities resulting from head injuries pre- and post-repeal of mandatory helmet use laws in Colorado, Kansas, and South Dakota found that the number of such fatalities doubled after the repeal. Other NHTSA studies found that in states with mandatory helmet laws, the rate of compliance is very high (about 95%); after the laws are repealed, the rate decreases to below 60%. In all the states studied by NHTSA, the rate of head injuries increased after helmet law repeal. A study of motorcycle accidents in Illinois, which does not require helmet use, showed the motorcycle accidents resulted in three times as many serious or fatal head injuries as in Michigan, which has a mandatory helmet law. Subsequent to these various studies, NHTSA has requested the governors of repeal states to work for reenactment and those from states that have helmet laws to retain them. Each state has been asked to collect data on motorcycle helmet use and accidents involving head injuries and fatalities. The medical community, voluntary safety organizations, and citizen action groups have been made aware of the NHTSA report and have been asked to support helmet laws. Popular myths regarding helmet usage are refuted by facts from the NHTSA study.

by Pamela Fallows
Department of Transportation, Office of Public and Consumer Affairs, Washington, D.C. 20590
Publ: Transportation USA v5 n4 p26-7 (Summer 1979)
1979
Availability: See publication

HS-026 826

ACCIDENTS INVOLVING HANDICAPPED DRIVERS

Background on the development of, and the use by handicapped drivers, of adaptive driving aids, and a review of the literature on driving by the handicapped (specifically accident involvement) are followed by a description of a study concerning the relative accident involvement of handicapped drivers, restricted to use of full hand controls, compared to other drivers. Using data from a driver population file of New York State drivers over 3 1/2 yr period, it was found that the handicapped drivers had a statistically significant higher accident rate (per driver) than nonhandicapped drivers. It was demonstrated that the accidents involving the full hand control group differed significantly from those involving other drivers by such accident variables as weather conditions, road system, and accident type. More data are needed on the relative driving exposures of the two groups. This study does not indicate that handicapped drivers using hand controls are necessarily more accident-prone than other drivers, but that they do have special driving problems. Handicapped persons need adequate equipment, training and driving experience to meet or exceed the safety records of other drivers. Recommendations for further research include studies of the performance of various mechanical assistive devices, a survey of the handicapped drivers in the present study, studies of the differences in various subgroups of the handicapped, and an examination of the question of state inspection of hand controls.

by D. Barry Negri; Richard A. Ibison
New York State Dept. of Motor Vehicles, Div. of Res.;
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
DOT-HS-4-00936-5
Publ: Rehabilitation Literature v40 n5-6 p149-53 (May-Jun 1979)
1979 ; 12refs
Availability: See publication

HS-026 827

EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?

A review is provided of judicial and legislative reaction (particularly in California) to pressures to extend the liability of the alcoholic-beverage vendor to his patron. California appellate courts have invariably rejected the liquor furnisher's civil liability for damages beyond the premises incurred by any patron, resulting from the latter's intoxication. A recent decision negated the use of comparative negligence to impose liability on the patron, at least in the case of adult plaintiffs. On 2 Jun 1977, a trial court's decision of first impression, holding that a tavern owner might be found liable to a minor patron, was denied appellate review on procedural grounds. The unreasonableness of the "tender years" rationale, which has been asserted to establish liability where none is generally believed to exist, is asserted in support of the conclusion that this class of minor plaintiffs cannot be permitted to benefit from its own wrongdoing. Potential defendents and their insurers must not bear the intolerable economic burden of assuming primary responsibility for consequences of drinking-related criminal conduct of minors, which often defies the law of self-preservation. Driving under the influence of alcohol demonstrates willful disregard for the minor's own safety. Holding the vendor liable for actions of minor patrons might encourage vendors to serve only adults, but vendor liability would encourage further disregard of the criminal law by minors engaged in drinking/driving. Stricter law enforcement, by way of criminal sanctions for both furnisher and consumer, rather than windfall civil recovery by the latter, is the most acceptable solution.

by William R. Slomanson
Publ: Pepperdine Law Review v5 n1 p1-19 (1977)
1977 ; refs
Availability: See publication

HS-026 828

ACCIDENT FATALITIES, CANADA 1976

A series of comparative tables on accident fatalities (1975 vs 1976) is followed by detailed breakdowns of deaths in 1976 for each type of accident by age, sex, and province of Canada. Of the 167,009 deaths attributable to all causes in Canada in 1976 accidents accounted for 11,251 or 6.7%, down from 7.3% in 1975. The number of accident fatalities decreased by 1326 or 10.5%, and the rate per 100,000 population declined from 55.4 to 48.9. The ten leading classifications of accident fatalities, representing 94.6% of the total, were: motor vehicle (traffic), 45.4%; falls, 16.2%; drownings, 8.6%; fire, 6.8%; industrial type, 6.0%; poisoning 4.7%; suffocation, 4.3%; aircraft, 1.3%; firearms, 0.8%; and motor vehicles (nontraffic), 0.5%. Of the 5110 traffic fatalities, 76.6% were due to injuries sustained in three types of accident: collision with another vehicle, 1854 (36.3%); loss of control, 1199 (23.4%); and collision with pedestrian, 863 (16.9%). The 15-24 age group accounted for 1934 deaths or 37.8% and children under 15 years for 546 or 10.7%. The overall motor vehicle traffic fatality rate per 100,000 population decreased from 25.5 in 1975 to 22.2. For males, it decreased from 37.3 to 32.5; for females, from 14.1 to 12.0. Of the 863 pedestrian fatalities in motor vehicle accidents, 241 (27.9%) were children under 15, and 280 (32.4%) were persons over 55. Motor vehicle exhaust gas accounted for 86 of 127 deaths in the gas-vapor group. Of 62 motor vehicle (nontraffic) fatalitis, 16 involved children under 15. Next to motor vehicles, the home accounted for most of the fatal accidents.

Canada Safety Council, 1765 St. Laurent Blvd., Ottawa, Ont., Canada K1G 3V4
1977? ; 26p
Prepared in cooperation with Statistics Canada, Vital Statistics Section.
Availability: Corporate author $2.50

HS-026 829

FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE

Questions commonly asked about modifying one's vehicle to use either propane or gasoline are answered, based on firsthand experience of the author who had a propane system installed in his car. The following aspects of propane conversion are covered: main reason for conversion, unlimited propane supply (price of propane 50 to 65 cents/gal as of Jun 1979); cost of system installation (about $1100 to $1200 in a car, about $800 in a pickup and about $300 for adaptation to new car), do-it-yourself installation (not advised); safety (exploding tank from rear impact or propane leakage in rollover accident unlikely with good equipment and correct installation); space taken up; operation on either gasoline or propane (including chance for fuels mixing); fewer emissions; better performance; no harmful engine effects; and illegality of installation in hatchback. Some of the disadvantages of propane conversion are also outlined: less fuel-efficient (decrease of 10% to 15%), unavailability of propane filling stations, restrictions from going through tunnels and over bridges, reduced trunk space, and limited travel range between stops because tank should be filled only 80%. Information is given on finding a dealer to install a propane system, including a list of propane-conversion shops. Photographs show an installed system.

by Mort Schultz
Publ: Popular Mechanics v152 n3 p48A-48D (Sep 1979)
1979 ; 2refs
At head of title: Saturday Mechanic.
Availability: See publication

HS-026 830

HOW WE'LL RUN KILLER TRUCKS OFF THE ROADS

Fatalities in U.S. truck-related accidents increased consistently from 3483 in 1975 to 5120 in 1978. In 1978, the 191,837 new registrations of heavy trucks hit an all-time high, up 23% from 1977. On-the-spot investigations by the National Transportation Safety Board (NTSB) have found that many accidents result from mechanically deficient trucks and/or irresponsible operation. Of the 29,936 accidents in 1977 involving heavy trucks regulated by the Interstate Commerce Commission, 1650 involved trucks with mechanical defects; contributing to the remainder were truck or light-vehicle driver negligence, drinking, fatigue, and highway conditions. In one spot safety check in Pennsylvania in 1978, 382 out of 711 trucks were found in a hazardous condition. Since brake defects are the major culprit, NTSB urges construction of runaway "escape ramps" to avert brake-loss accidents on steep grades. The new Federal Motor Vehicle Safety Standard (FMVSS) 130 (revision of FMVSS 121) sets requirements in such areas as better resistance of truck brakes to heat buildup, a reasonable 60 mph stopping distance, and backup braking. Other National Hwy. Traffic Safety Administration proposals to reduce heavy-truck accidents include self-adjusting brakes for new trucks, better policing to get illegal/unsafe drivers off the road, stricter operating hours, speed-governing devices, installing tachographs, and underride barrier standards. The industry's self-regulation efforts are no substitute for the removal from the highway of incompetent and unsafe drivers, through government and industry cooperation. Some defensive driving tips for the motorist include keeping to the right lane, dropping speed and pulling close to shoulder on two-lane highways when a truck wants to pass, using lights to help trucks pass, being aware of potential runaways, and checking traffic before crossing signalized intersections.

by Mort Schultz
Publ: Popular Mechanics v152 n3 p77, 80-1, 211 (Sep 1979)
1979
Availability: See publication

HS-026 831

ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS

Industrial truck builders say that electric-powered lift trucks will soon overtake those powered by the traditional internal combustion machines, mainly because of rising fuel prices and impending Federal standards for vehicular noise. Electrics have virtually taken over the riderless vehicles; what remains is greater infiltration of rider-type machines (70% of the industrial truck business). The industry's leading builders of industrial trucks (Clark, Hyster, and Eaton) are increasing their manufacturing capability for high-volume production of electric lif trucks. Little change in the design of future lift trucks is anticipated by the industry, with steel continuing to be the most widely used material, chiefly for its inherent weight as a counterbalance to heavy lift loads. The design of electric trucks is limited by battery size. If a smaller-size battery with present-day performance is developed, some design changes may occur.

by John A. Stark
Publ: Truck and Off-Highway Industries p53-7 (Jul-Aug 1979)
1979
Availability: See publication

HS-026 832

THE ELECTRICS ARE COMING

The Dept. of Transportation and The Dept. of Energy (DOE) are sponsoring the development of electric and hybrid vehicles, and foreign and domestic automakers are actively involved in electric vehicle (EV) research. The state of the art is centered around three vehicle classes: the all-electric, the hybrid, and the flywheel hybrid. All-electrics depend solely on the onboard storage batteries for power. Hybrids are of two types: an electric motor-driven system with some type of fuel-burning used to run a generator, and a more sophisticated hybrid concept that employs the fuel-burning engine to drive the vehicle in combination with the electric motor. The latest hybrid, under development by DOE, employs a flywheel to recover and store kinetic energy through regenerative braking. Most types of EV'S employ a regenerative braking system, whereby resistance caused by using the vehicle inertia to partially recharge the batteries aids in slowing down the vehicle. The lead/acid battery is still the best storage system, and the most promising new-generation system is the nickel/zinc battery which theoretically has twice the specific energy of lead/acid batteries. If cycling times can be increased and costs reduced, it could replace the present type. Metal/air batteries hold promise but are limited in peak power output. Zinc/chlorine hydrate batteries have theoretical specific energy about five times that of lead/acid systems, but supporting equipment is bulky. Molten-fuel sodium/sulfur batteries offer potential for extended cruising ranges, but present insulation and supporting equipment problems. To date, the greatest advance in EV development has been in the control system, now more much efficient. The goal is a 200-mi-plus range at highway operating speeds.

by Chuck Nerpel
Publ: Motor Trend v31 n9 p92-3 (Sep 1979)
1979
Availability: See publication

HS-026 833

LITTLE CARS: THEIR TIME HAS COME

Little, economical cars envisioned for the near future U.S. market will be essentially two-passenger vehicles, with overall lengths of about 120 in and widths of about 50 in (compared to respective figures of 145.5 in and 59.3 in for a Honda Civic). These subcompacts will have gasoline or diesel engines ranging from 400 to 1000 cc, with hp ranging from 25 to 40. Engines and drivetrains will be at one end of the vehicle to help reduce weight and to allow for best interior space utilization. Luggage capacity will be very limited, intended mainly for carrying groceries, in line with the urban nature of the car's design. Fuel capacity will be about 6 gal, with mileage in the 60 to 80 mpg range. All cars must comply with Federal and state emissions and safety requirements. Lightweight metals and high-strength plastic will be used to keep vehicle weight down. The Japanese are the current world leaders in the development and manufacture of such high-mileage, miniature automobiles. Despite past failures in marketing tiny cars in the U.S., they will soon try again. The first of these might be the Subaru Rex 550, a four-passenger cruiser powered by a 544 cc, 4-cycle, 2-cylinder engine, with economy in the 60 mpg range. Another Japanese manufacturer, Mitsubishi, is a leader in emission control in small-displacement engines; it has recently applied its MCA-JET system to the 550 cc, 2-cylinder engine in its Minica Ami sedan. More than 25 years after the unfavorable U.S. reception of some small, fuel-efficient cars which were ahead of their time (e.g. the Nash Metropolitan, the Goggomobile Coupe De Ville (German), and the Citroen 2CV), the American public is faced with the choice of adapting to tiny cars or using public transportation.

by Fred Stafford
Publ: Motor Trend v31 n9 p82-5 (Sep 1979)
1979
Availability: See publication

HS-026 834

MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY

Prospective buyers of mobile telephone systems are confronted with a wide array of hardware options. There is also the possibility of leasing phone equipment which can be operated under the lessor's Federal Communication Commission license. Leasing costs average between $75 and $90 per month, depending on whether the lessor is a private firm (radio common carrier) or the local telephone company. Leasing has the additional advantage of providing quicker access to a mobile-telephone number, for which there are long waiting lists. Prices for the mobile telephone begin at $1300 for a simplex (push to talk/release to listen) manual (place call through operator), with from 6 to 12 channels. Within the $1300 to $1800 range, there are a number of walkie-talkie or attache case phones which offer portability at the cost of reduced transmission/reception. "Real" mobile telephones begin at $1900 for a duplex (simultaneous talk/listen) direct-dial phone with a rebuilt transmitter/receiver box installed in the trunk. A brand-new, standard car telephone will cost $3000 plus $100 for installation, with optimal extra convenience features (e.g. channel scanning). Mobile-phone users pay monthly subscription fees ($12 to $18), regular toll charges, and air-time fees. Prudent users have monthly bills ranging from $40 to $60. It is noted that mobile telephone channels are shared, precluding confidentiality.

by Rudi H. Niedzielski
Publ: Motor Trend v31 n9 p60-1 (Sep 1979)
1979
Availability: See publication

HS-026 835

ON BECOMING GASOLHOLIC

Gasohol (one part ethanol, nine parts gasoline) is compatible with today's fuel systems, and produces minimal problems in unmodified engines, with minor emission, fuel economy, and performance effects. Gasohol can lead to slight start and driveability difficulties in some newer cars tuned to the lean limit for emissions control. It can increase fuel consumption by as much as 3%, but usually will have no effect. Gasohol reduces carbon monoxide emissions slightly, and may raise or lower hydrocarbons and nitrogen oxides. Although alcohol raises the fuel's octane rating (providing antiknock benefits), its volatility could result in poorer hot-weather driveability. The question of gasohol's net energy contribution remains to be answered. Even if ethanol conversion becomes extremely energy-efficient, if all the pilot production programs work (such as those being sponsored by the Dept. of Agriculture), and if there is enough damanged feedstock from which to distill ethanol, distilling capacity is a large obstacle to large-scale gasohol production. Turning the 100 billion gallons of gasoline used per annum in the U.S. into gasohol would require the production of 10 billion gallons of ethanol each year. At present, the ethanol-distilling capacity amounts to a mere fraction of that figure.

by Rich Ceppos; Gary Witzenburg
Publ: Car and Driver v25 n3 p28-30 (Sep 1979)
1979
Availability: See publication

HS-026 836

MAKING THE MILEAGE. THE ENGINEER'S DIET. PT. 2

Based on information provided by automotive engineers, a guide is presented to help the driver operate his car's engine efficiently. For carbureted engines, the key to good fuel economy is the carburetor. Driving for economy is mostly a matter of staying out of the power mixture (maximum power approaching full throttle when a power valve in the carburetor opens, substantially increasing fuel flow). Using a gauge for measuring intake-manifold vacuum (which triggers the power mixture), the throttle openings can be kept small enough to avoid the triggering point. The power-valve setting for an individual car can be obtained from the manufacturer's customer-relations department. For best mileage, operating in the area of maximum spark advance and keeping the revs down (i.e. getting into top gear as soon as possible) are recommended. For turbocharged gas engines, such as those in Buicks, the same operating rules apply as for their non-turbocharged counterparts (i.e. stay out of the power mixture if the extra performance is not needed). Fortunately, all turbocharged Buicks come with a manifold-pressure gauge in the form of a sequence of lights. For fuel-injected gas engines, recommendations for the D-Jetronic electronic system are to use a steady foot and to drive in the light-throttle range. For the L-Jetronic electronic and K-Jetronic mechanical systems with power-enrichment, the only fuel-economy action available for the driver is to use small throttle openings whenever possible. For all these Bosch injection systems, it is important to drive away as soon as the engine starts, and to avoid a lowering of the manifold vacuum (caused by tired spark plugs or leaking valves, for example). Diesels are the easiest to drive for economy; for best economy, low speed and constant fuel settings are recommended. It is possible to improve economy by eliminating emissions-control hardware, but the job is extremely complicated. To drive an electronic-spark-advance Chrysler for best economy, it is necessary to avoid closing the throttle as much as possible.

by Patrick Bedard
Publ: Car and Driver v25 n3 p45-50 (Sep 1979)
1979
Pt. 1 is HS-026 526.
Availability: See publication

HS-026 837

AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS

Data collected from the arrest records of Randolph County in northeast Arkansas provided an opportunity to analyze the relationship between the age and the BAC (blood alcohol concentration) of persons arrested for alcohol-related offenses. BAC's of young people arrested for driving while intoxicated (DWI) and public drunkenness over a four-year period tended to be lower than those of older arrestees. The low number of offenders aged 25 or over with BAC's below 0.10% (0.09% the legal limit in Arkansas) is perhaps a consequence of older drinkers' having learned to compensate for the early effects of alcohol or having developed a repertoire of skills dealing with intoxication, including the ability to conceal or excuse minor behavioral aberrations. The large number of offenders aged 15-24 at BAC's below 0.10% is due to one or both of two factors: young persons are more likely to behave in such a way that police officers conclude that they are sufficiently intoxicated to be dangerous on the highways (even when they are not), or police officers find it convenient or desirable to arrest young persons who are not dangerously intoxicated. Novice drinkers can also experience "psychological intoxication" (i.e. abnormal excitement after drinking only a small amount of alcohol). Randolph County has been legally "dry" since 1953, and public sentiment against drinking is strong. The police department has been aggressive in its efforts to reduce drunk driving; nearly one-third of the incarcerations for each year between 1973 and 1976 was for DWI, three times the national rate.

by Steven D. Shults; Norman R. Layne, Jr.
Publ: Journal of Studies on Alcohol v40 n5 p492-5 (May 1979)
1979 ; 9refs
Availability: See publication

HS-026 838

THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMIN

Thirteen paid student volunteers (9 male, 4 female) participated in a double-blind crossover experiment to investigate the effects of a therapeutic dose of dexchlorpheniramine (DCPA) alone, and in combination with a social dose of ethanol (ethyl alcohol) on perceptual, cognitive, and motor functions. Both ethanol (0.75 g/kg) and the antihistamine (4 mg/70 kg) were given orally. Although a synergistic effect of DCPA with ethanol was observed in only some of the clinical tests, a delayed recovery from the effects of the combination was noted. Subjective evaluations indicated that the sedative effects of DCPA were more pronounced in the presence of alcohol.

by H. M. Franks; V. R. Hensley; W. J. Hensley; G. A. Starmer; R. K. C. Teo
Publ: Medical Journal of Australia v1 p449-52 (22 Apr 1978)
1978 ; 12refs
At head of title: Drug Trials.
Availability: See publication

HS-026 839

POWER TAKE-OFFS FOR TRUCKS

Information is presented on pto's (power take-offs), which are basically gear-driven units that fit to, and derive their power from, the truck gearbox, transmitting that power through a drive shaft to the unit to be driven (e.g. winches, compressors, cranes). Categories of pto are described and illustrated: layshaft drives (including rear-mounted types), front-of-engine crankshaft-driven units, sandwich units between engine and gearbox, and split propeller shaft drives. Special adaptor gear assemblies, which have to be fitted to some gearboxes before attachment of pto's, are discussed, as well as speed change adaptors. Torque ratings are considered. The following aspects of the selection of a pto for a specific application are discussed: number of pto speeds, the direction of rotation of the equipment to be driven, output shaft hp and speed, gearbox capability, and type of gearbox. The installation of the pto and the driven unit for correct meshing is considered. Control systems are described, with special mention of the air shift. All truck and gearbox manufacturers are urged to pay more attention to the prospective needs of their users.

by Victor P. Rigby
Publ: Automotive Engineer v4 n3 p79-82 (Jun-Jul 1979)
1979 ; 1ref
Availability: See publication

HS-026 840

ROAD TRAFFIC ACCIDENTS: THE DOCTOR'S POINT OF VIEW

In a study of 135 road traffic accident admissions (38.8% of all accidents analyzed) classified by age, sex, and distribution of injuries, it was found that the adolescent and young adult males were mostly affected. The bed utilization rate in the wards where these accident victims were admitted was found to be lower than for other wards, possibly because head and neck injuries, which are the most common, have the highest fatality rate and may leave permanent residual disabilities. Ways by which the services in hospitals, both specialist and general, can be organized for a more economic and efficient care of road traffic accident casualties are discussed. Efficient on-the-spot first aid service should include organization and training of policemen, ambulance drivers and their crews in first aid. Experience has shown that with multiple casualties, attention should be given first to the quiet victims, who are often in more need than those who are actively complaining. The problem of sufficient beds in hospitals with many accident cases may be partially solved by improving the quality of accident care in peripheral hospitals, thus reducing the number of referrals. Also recommended are the training of physicians and surgeons in management of the acute phases of both head and spinal injuries; establishment of trauma services in all major general hospitals; a team approach to injured patients; and development of comprehensive regional accident services. Continued education in seminars and workshops would keep doctors up to date in management of the injured. In rural hospitals with only one doctor, the paramedical staff should be especially well trained. Minimizing disabilities with the purpose of successful rehabilitation should also be of concern. It is recommended that the doctor be a member of a National Motor Vehicle Safety Committee which is charged with the responsibility of approving the manufacture or importation of vehicles that meet basic safety requirements.

by S. E. Asogwa
Publ: African Journal of Medical Sciences v7 p29-35 (1978)
1978 ; 26refs
Summary in French.
Availability: See publication

HS-026 841

FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES

A series of nine working papers, chronologically sequenced, are the result of a study to develop a statistical methodology and to formulate specific statistical procedures for the analysis of in-use automobile fuel-economy data. The methodology developed addresses specific aspects of the following three issues: difference between actual, in-use gas mileage numbers and those reported in EPA (Environmental Protection Agency) certification tests; the reliability of EPA fuel-economy figures in providing a relative measure of gas mileage; and the tendency for the discrepancy between EPA and in-use gas-mileage figures to increase from one model year to another. To a considerable extent, however, the methodology represents adaptation of statistical techniques to generic questions which are not unique to the fuel-economy problem and can, accordingly, be construed in a much broader context. The topics covered by the working papers include upward bias of variance computed relative to the harmonic mean; bases for statistical estimation of fuel economy; estimating the standard error for a sample harmonic mean; considerations pertaining to the effect of accumulated odometer miles on mpg shortfalls; aggregation of data from sources with groups of "replicate" vehicles; philosophical and analytical issues affecting the Federal Energy Administration fuel-economy study; a regression/covariance analysis approach to estimation of fuel economy; some considerations affecting vehicle ranking according to fuel economy; and a regression approach to that ranking.

by H. T. McAdams
Falcon Res. and Devel., 1 American Drive, Buffalo, N.Y. 14225
DOE-P-14-77-6037-0
Rept. No. HCP/M6037-01 ; 1977 ; 119p refs
Availability: NTIS

HS-026 842

AUTOMOBILE INSURANCE--1978

Statistics on U.S. auto insurance business for 1978 (and 1975, 1976, and 1977 to indicate trends) are tabulated and discussed. Direct premiums, percentage of the total market, gain in premiums, loss ratio, and percentage of total premiums are given for leading automobile insurers, leading writers of private passenger auto insurance, and leading writers of commercial auto insurance. The percentage of the market share is estimated for national agency companies, regional companies, and direct writers (all auto business, and private passenger market); the trends in market shares are provided for the top 25 companies over the last four years. The total auto insurance premium distribution and leading writers by state are tabulated. In 1978, the direct premiums received by insurance companies for automobile coverages totaled $33.5 billion, a 9.9% increase over 1977. Private passenger liability premium volume (47.9% of the total auto business) gained 7% to reach $16 billion; the pure loss ratio rose 1.3 points to 64.7%. Commercial auto liability (13.5% of the total) was ahead 14.8%, reaching $4.5 billion; it gained nearly 4 points in loss ratio to 61.7%. Private passenger physical damage premiums (31.8% of the total) were $10.6 billion, a gain of 10.4%; the loss ratio was up more than 3 1/2 points to 65.2%. Commercial physical damage (6.9% of the total) showed an 18.7% gain in premiums to $2.3 billion; the loss ratio of 55.4% was 2.2 points above 1977. The emphasis on sales remained with the direct writers (a gain of more than 1/2 point in total market share); regional/specialty companies also increased, while the national companies lost a full point.

Publ: Best's Review v80 n4 p29-30, 92-3 (Aug 1979)
1979
Availability: See publication

HS-026 843

100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)

Electric Test Vehicle-One (ETV-1), the first car to be built under the Dept. of Energy's (DOE) Near Term Electric Vehicle Program, was designed to have a driving range of 100 mi at speeds of up to 45 mph with two passengers (70 mi range in stop-and-go city driving with four passengers). The car will travel 115 mi at 35 mph constant speed. It has a cruising speed of 55 mph, passing speed of 60 mph, and the ability to climb a 5%, 1-mi grade at 50 mph. ETV-1 meets all Federal Motor Vehicle Safety Standards but one (glazing in side and hatch windows). It offers occupant protection in a 30 mph barrier crash. The electric vehicle is front-wheel driven by a separately excited dc motor, with transistorized choppers to control both armature and field power (newly designed by General Electric Co., the prime contractor). Batteries are an improved lead-acid type designed and fabricated by Globe Union, Inc., a major subcontractor. They have an energy density exceeding 17 Wh/lb and are expected to endure 500 deep-discharge cycles. Chrysler Corp., as another major subcontractor, had the responsibility for vehicle styling, body and chassis design, and vehicle fabrication. The car has 40% less aerodynamic drag than comparable subcompacts. With about the same exterior dimensions as Chevrolet's four-door Chevette, the ETV-1 is about 1300 lb. heavier (despite use of aluminum and high strength low alloy steel). A microprocessor in the power-conditioning unit manages power flow throughout the propulsion system. DOE says ETV-1 was designed as a practical car that could be mass produced for about $6400 (1979 dollars) by 1985. Life-cycle cost (10 yr lifespan) is estimated to be less than 18 cents/mi.

Publ: Machine Design v51 n17 p4, 6 (26 Jul 1979)
1979
Availability: See publication

HS-026 844

THE PROTECTION AFFORDED BY SEAT BELTS

The development of the seat belt is traced from early cumbersome designs through present automatic and passive restraint systems, with comments on the effects of each. Summaries are provided of eight selected European and U.S. accident studies concerning seat belt effectiveness in reducing or preventing injuries. Estimated reduction of serious injuries was found to vary from 45% to 70%. Seat belts were probably more effective in reducing the most serious injuries, particularly those to the head. Another study concluded that the wearing of seat belts by motorists in Victoria (Australia) reduced fatalities by at least 40%. Pre- and post-legislation wearing rates in Melbourne (Vic.) Australia, New Zealand, and some European countries are provided, and the wearing rates in Britain for five years up to 1977 are plotted. After the introduction of mandatory seat belt use legislation in Australia and New Zealand, for example, it was found that the percentages of car occupants wearing belts rose eventually to 80% or 90%. If legislation were to have the same effect on wearing rates in Great Britain, it is estimated that the annual decreases in fatalities and serious injuries, based on 1976 casualty figures, would be 630 and 12,900, respectively.

by G. Grime
Transport and Road Res. Lab., Accident Investigation Div., Crowthorne, Berks., England
Rept. No. TRRL-SR-449 ; 1979 ; 25p 16refs
Availability: Corporate author

HS-026 845

VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE

It is demonstrated that simple two-dimensional steady-state handling theory will predict a vehicle's over- or under-steering characteristics. The terms "oversteer" and "understeer" can be defined mathematically and confirmed experimentally using the recommended method. It is shown that a vehicle's handling capability can be drastically changed by the mixing of tires; cornering stiffness for different tire sizes is compared. Among the tires tested, the steel radial was the "stiffest", followed by the textile radial and crossply. Experimental results from the handling tests are compared with simple theoretical predictions. It is easy to alter the basic characteristics of a vehicle, especially at high speeds, by combining unsuitable pairs of tires on t front and back; e.g., stiffer front tires than rear tires tend promote the oversteering condition. Handling characteristi can also be affected by tire pressures. To describe the behavi of a vehicle under all conditions is very complex, but by r stricting the theoretical approach to two degrees of freedo and considering only the steady state response, a much simpl fied mathematical model is derived which gives a satisfactor prediction of the vehicle's behavior.

by D. N. Bulman; N. A. Leadbetter
Publ: Automotive Engineer v4 n3 p29-32 (Jun-Jul 1979)
1979 ; 3refs
Availability: See publication

HS-026 846

SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)

The criteria for selecting the appropriate types of tires fo commercial vehicles is discussed from the viewpoint of the development and availability. Developments leading to the stee belted radial tire are described and advantages of the radial ti enumerated. Tread patterns are illustrated; speed categories an classification by load capacity discussed. Selection criteria ar based on the vehicle design, dimensions, and use. Permissibl load per axle must be considered and a choice made betwee dual tires or special single tires. Extremes of temperature an difficult off-road conditions also require specially adapted tire Careful installation and attention to wheel alignment, tire pres sure and load are essential. Adjustment of load in a towe trailer is especially important. Driving habits, the way roads ar laid out, and conditions of road surface affect tire wear. In lon distance service, routine visual inspection of tire wear and possi ble damage are absolutely necessary. Prompt repairs may sav the tire and avoid safety hazard. Retreading must be performe competently and according to the manufacturer's instruction while at least 4 mm of tread depth remain. Appropriate storag of the tires, in a cool, dry, dark area, increases their service life It is predicted that full drop center tires (especially for the 20 and 16" wheel rims) with a cross-section ratio H/W (height width) 1 will remain on the market for a long time; but tire for tapered wheel rims with the standard H/W 0.85 (espe cially in sizes of 22.5" and 17.5") have many advantages an will eventually take over. To fulfill the requirements of com mercial vehicles, tires with a smaller H/W ratio will also b needed. Many new tread patterns, based on a wider flatte tread, will be needed to satisfy diverse requirements.

by Heinrich Meyer
Publ: ATZ Automobiltechnische Zeitschrift v81 n5 p233-4, 237-40, 243 (1979)
1979 ; 4refs
Translated from German (original 7p; translation 17p).
Availability: Reference copy only

HS-026 847

FUTURE AUTOMOTIVE TECHNOLOGY. A RESEARCH BLUEPRINT

A condensation, interpretation and amplification of the principal conclusions reached at the Boston meeting are presented. Three panels were organized, covering engines, fuel and powertrain systems, and vehicle structures and materials. The theme of the conference was basic research and the achievement of a fuller understanding of the physical and chemical processes underlying automotive vehicle technology. It was concluded that, through development and application of advanced technology, it is possible to achieve a total motor vehicle system with less dependence on imported petroleum than that legislatively mandated by the mid-1980's, while at the same time satisfying the implied requirements of safety, emissions and cost; some felt that a marketable 40 to 50 mpg automobile fleet is feasible by the year 2000. A well conceived and adequately funded program of basic research was urged, with the Federal government taking a leadership role. The recognized need for a capability to analyze the nation's automotive enterprise as a system led to recommendation of an Automotive Systems and Policy Analyses program. This would provide policy makers with the tools to examine all aspects of the automotive/energy system, would provide a guide for government and industry, and would aid in decision making on research priorities and resource investments, as well as energy and material conservation strategies and policies. A basic research agenda outline is suggested, including, besides the program just described, research on thermodynamics, combustion and fluid flow; structures; energy storage; engine/fuel interactions; materials science and processing; control systems; and friction and wear.

Department of Transportation, Washington, D.C. 20590
1979 ; 34p 1ref
Summary of Proceedings of the Conference on Basic Research Directions for Advanced Automotive Technology (2 Vol.), held in Boston, 13-14 Feb 1979.
Availability: Department of Transportation, Publications Div., S-88, 400 7th St. S.W., Washington, D.C. 20590

HS-026 848

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT

An assessment was made of the capabilities of the Citizens Band (CB) Radio Service (and other services in the Personal Radio Services) and of Travelers Information Stations (TIS) to provide emergency communications for civil preparedness operations. By a survey of state and local civil preparedness agencies, state police and highway patrol agencies, and volunteer CB organizations, the range of uses currently made of CB and TIS was determined. Among the formal organizations evaluated were REACT International, Inc., and ALERT Section, American Citizen Band Operators Association, Inc. The role of the Defense Civil Preparedness Agency in providing guidance in the use of CB and TIS in emergency situations was evaluated. Also evaluated were uses made of CB by truckstops, applications of CB by the National Weather Service SKYWARN program, impact of NHTSA National Emergency Action Radio program on emergency operations, and appropriate functional relationships between CB and amateur radio in emergency operations. The project found CB operators and their equipment, as well as TIS systems, valuable resources in emergency situations, and recommended a program to stimulate their effectiveness. Other specific recommendations encourage the use by state and local civil preparedness agencies of the CB Radio Service and the TIS. Appended are draft Civil Preparedness Circulars for CB and TIS, and a discussion of the impact of recent Federal Communications Commission Rules and Regulations changes on the effectiveness of the Radio Amateur Civil Emergency Service.

by Murray Rosenthal
System Devel. Corp., 2500 Colorado Ave., Santa Monica, Calif. 90406
DCPA01-76-C-0330
Rept. No. TM-5752/002/01 ; 1978 ; 386p 143refs
Availability: Corporate author

HS-026 849

FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT

Appendices are presented to the preliminary draft report of a joint task force to recommend long-range energy goals for motor vehicles. Included are a 1975 letter of assignment for the Energy Resources Council to the task force, a set of marketing and mobility models forecasting long-range national trends, studies on petroleum consumption, safety, air quality and health, material requirements and availability, and current automobile industry research and development reported by Chrysler, Ford, and General Motors.

1976 ; 110p
Vol. 1 is HS-019 456; Vol. 2 is HS-019 457.
Availability: GPO

HS-026 850

MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)

The systematology of various designs of mechanical boosters is described, with an explanation of which systems are suitable for today's needs and how to achieve optimum acceptance. Four categories of booster systems are studied: variable path ratio, adapted spring-assisted system, first-degree force dependence, and second-degree force dependence. Calculations of the maximum attainable amplification factor are included. It is concluded that, in contrast to pneumatically or hydraulically assisted boosters, mechanical force amplifiers demonstrate greater reliability and in many cases lower manufacturing costs. Photographs and diagrams illustrate the systems.

by Hans O. Schroter; Hans Jurgen Schroter
Publ: ATZ Automobiltechnische Zeitschrift v81 n5 p211-2, 217-8 (1979)
1979
Translated from German (original 4p; translation 11p).
Availability: Reference copy only

HS-026 851

RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)

Trends are examined which emerged when comparing individual types of vehicles and their statistical data collected over a 8-year period by the Rhineland Industrial Monitoring Union in Cologne. Causes of vehicle damage may be design and fabrication defects, poor maintenance or improper operation, and wear and tear and aging. The defects most frequently appearing in vehicles over 6 years old are ranked in descending order: frames and supporting elements; parking brake on one side; low beam adjustment; engine and transmission leaks; front wheel suspension; exhaust system; foot brake on one side; headlight reflector; exhaust emission (high carbon monoxide reading); turn signals; tail lights and brake lights; tire tread depth; and steering mechanism. Analyses of these defects are presented. The number of defects in the wheel bearings remains constant at a low level, but testing methods should be improved. Data collecting of this kind should be very helpful to used-car buyers as well as to manufacturers. Special attention should be paid to the defects most frequently resulting in accidents, and the costs necessary to correct the defects found during periodic inspections must withstand a severe cost/effectiveness analysis.

by Hans Georg Hirschberger
Publ: ATZ Automobiltechnische Zeitschrift v81 n4 p167-70, 173 (1979)
1979 ; 5refs
Translated from German (original 5p; translation 15p).
Availability: Reference copy only

HS-026 852

COLLEGE STUDIES AUTO BODY REPAIR PROBLEMS

At an April 7, 1979, workshop at Bronx Community College, problems of the automotive industry were considered, in order to establish a college training program for automotive repairmen, bodymen, and transmission men. At the collision workshop, 29 people discussed their problems openly and freely. The difficulty of providing estimates on repairs was considered, with reference to the prevailing labor rate; repeal of the McCarran-Ferguson Act was urged. Dependence on insurance companies by the auto body shops was opposed; it was recommended that non-profitable jobs, where the insurance company dictated prices, should be refused, and that shop owners' standards should not be compromised.

Publ: Collision v3 n2 p9-11 (Apr 1979)
1979
Availability: See publication

HS-026 853

IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?

Results are summarized of a two-day, three-panel conference to discuss basic research activities which could provide a pool of technological objectives for automobile manufacturers to develop and apply during the post-1985 period; the panels dealt with fuels and power trains, vehicle materials, and engines. Secretary of Transportation Brock Adams indicated that gasoline would continue to be the only fuel for many years; that the science community should not waste its efforts in trying to find alternative fuel sources. Objections were raised by several people who said they had already solved some of the problems being discussed, but because they had patents and would seek royalties, neither the government nor the major oil companies were interested in the solutions. Don Randall of the Automotive Service Councils felt that the conference should have addressed the problem of service, maintenance, and repairs, which comprise about 1/3 of the total dollar value of the industry. In a discussion of the appearance and construction of cars through the 1980's the question of collisions between cars of different sizes is considered, with the possibility of separate lanes for different sized vehicles. The future for auto body repair may include basic sub-assemblies, perhaps a throw-away section of the vehicle readily replaced with bolt-on components. Although new specialized techniques will be developed for auto body repai no better alternative than an auto body shop is likely to b available for repair of a crashed vehicle.

Publ: Collision v3 n2 p4-5 (Apr 1979)
1979
Remarks at Dept. of Transportation Conference, Boston, 13-14 Feb 1979.
Availability: See publication

HS-026 854

TRAFFIC SAFETY PLANNING ON SCHOOL SITES

Principles of good traffic control are presented as guidelines fo all personnel involved either in designing and operating nev school facilities or in renovating and reconstructing existin facilities. It is recommended that local governmental and safet agencies be consulted; a list of resource organizations is append ed. Subjects covered include site selection for primary or ele mentary schools, and junior and senior high schools; and on-sit safety relating to school bus zones, parent pick-up and drop-of zones, parking, pedestrian and bicycle routes, playground are service roads, driveway and roadway design criteria, traffi control devices, and Federal, state and local requirements. Of site safety is reviewed in relation to land use surrounding th school. Safety on existing school sites is considered and modif cations suggested to eliminate traffic hazards. A checklist i included of goals to be achieved in providing safe and efficien movement of traffic around schools.

Institute of Transportation Engineers, (Michigan Section, District 3) Traffic Engineering Around Schools Com.
1978 ; 41p 6refs
Availability: Office of Hwy. Safety Planning, 7150 Harris Dr., General Office Bldg., Lansing, Mich. 48913

HS-026 855

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM

The Electric Power Research Institute (EPRI)/Tennesse Valley Authority (TVA) demonstration program was designe to promote participation by the electric utility industry in th development, application and commercialization of electric ve hicles (EV's) in the transportation network. Major objectives the program were to establish the characteristics, missions an capabilities of the best available state-of-the-art EV's in a repre sentative operating environment; to establish the key require ments for an EV support infrastructure such as managemen operator training, maintenance and service facilities, data acqu sition and evaluation, for viable, larger-scale demonstration pro grams; and to identify optimum ways for the electric utilit industry to participate in these programs. Descriptions are give of the initial testing and evaluation of non-prototype EV's in real-world environment, of the demonstration design, and finall of the data acquisition and reporting plans.

by Ralph J. Ferraro; David L. Harbaugh
Electric Power Res. Inst.; Southern Calif. Edison Co.
Rept. No. SAE-790110 ; 1979 ; 10p 1ref
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 856

THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER

As part of an investigation of the fundamental parameters controlling delivery of filtered fuel to the engine, the basic engineering factors required to understand how in-tank fuel strainers function are discussed. Guidance is provided for choosing fabrics that ensure optimum performance for various types of liquid fuels. The following major factors affect fuel strainer performance. The critical surface tension of the polymer must be less than the surface tension of any aqueous solution present in the fuel tank yet larger than the surface tension of the fuel. Water may be introduced at any point from the refinery up to the arrival of the tank truck, as well as by condensation in the fuel tank, and may dissolve sufficient material to provide a solution with a surface tension less than the surface energy of the polymer. Under these conditions, the "water" will wet the polymer surface. If the fuel wets the polymer surface, the fiber diameter need only be slightly larger than the width of the pores for the strainer to sustain fuel wicking. Water-fuel separation efficiency is best for very open fabric weaves, though this design would reduce the wicking capabilities of the strainer and make the strainer subject to water penetration as water is agitated by vehicular motion. The interdependence of performance upon pore size and fiber diameter means a compromise must be made after a review of the particular vehicle requirements. Uniformity of fabric weave, stiffness of the fibers, and resistance to fiber motion arising from interfacial forces are important requisites for a good fuel strainer fabric.

by Carl E. Miller
General Motors Corp., AC Spark Plug Div.
Rept. No. SAE-790091 ; 1979 ; 16p 5refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 857

APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE

Measurements taken in a special, single cylinder, direct injection stratified-charge engine are presented. The optical measurement techniques employed include continuous-wave laser Raman spectroscopy for fuel and air concentrations, pulsed laser Raman spectroscopy for density fluctuations, high-speed cinematography for flow visualization, and laser Doppler velocimetry for velocities and turbulence intensities. More conventional data on cylinder pressure, power, and emission levels are also given. The study is designed to demonstrate the types of detailed measurements that are now possible within an engine cylinder.

by S. C. Johnston; C. W. Robinson; W. S. Rorke; J. R. Smith; P. O. Witze
Sandia Labs., Livermore, Calif.
Rept. No. SAE-790092 ; 1979 ; 21p 12refs
Technical Paper Series. Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Sponsored by the Dept. of Energy and the Motor Vehicle Manufacturers Assoc. of America.
Availability: SAE

HS-026 858

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS

A closed-circuit television technique has been developed for the real time viewing and recording of combustion and related processes in internal combustion engines. The technique has been applied to a transparent piston, transparent head engine, where shadowgraphs of combustion chamber events have been observed and recorded. The technique is particularly suited for the study of changes in the combustion process due to variations of engine parameters such as mixture ratio, load, speed, spark timing, and injection initiation, since the changes can be observed and recorded as they occur. The key aspect of this television system which makes it applicable to rapidly varying events is the use of a solid state TV camera (Charge Injection Device) in conjunction with a pulsed laser light source which results in the charging of the camera sensor array in times of the order of microseconds. Included are diagrams of the components of the system, photographs of the system itself and the cyclic variation photographs it produces. A brief and qualitative study of flame and pressure cyclic variations is reported and discussed as an example of the particularly suitable application of the television technique.

by R. L. Steinberger; W. W. Madden; F. V. Bracco
Princeton Univ., Dept. of Mechanical and Aerospace Engineering
DOE-EC-77-S-02-4191; NSF-ENG77-12142
Rept. No. SAE-790093 ; 1979 ; 16p 8refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit 26 Feb-2 Mar 1979. Sponsored in part by General Motors Res. Labs.
Availability: SAE

HS-026 859

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE

The capability of the Laser Doppler Anemometer (LDA) for making measurements inside a piston-engine cylinder is demonstrated. The backscatter mode of LDA operation was used, requiring only a single window in the cylinder. An ensemble-average data-processing technique was developed to analyze the raw velocity-crankangle data. Single-component measurements of mean velocity and rms velocity fluctuation at a single point are presented as functions of crankangle for three engine speeds. A comparison of motored and fired results is shown for one engine speed. Measurements of two components of velocity at several locations show the basic vortical nature of the flow field in this particular engine. Both the mean velocity and root mean squared velocity fluctuation appear to scale well with engine speed. The turbulence is generated primarily in the intake portion of the cycle and remains relatively uniform and constant during the compression stroke. Motored and firing results are quite similar until the time of ignition, and differ noticeably only when the flame is near the location of the velocity measurement.

by Rodney B. Rask
General Motors Res. Labs., Fluid Dynamics Res. Dept., Warren, Mich.
Rept. No. SAE-790094 ; 1979 ; 15p 20refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 860

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE

A water analog was used to visualize and study the generation of turbulence in a simple geometry cylinder during the induction stroke. The flow field, during the induction process, was observed to be structured and highly repeatable from cycle to cycle. The structure consisted of two ring vortices, of concentrated vorticity, which were of the same scale as the engine cylinder. A detailed study of the characteristics of the vortex rings was carried out for the case of an axisymmetric cylinder geometry. Inviscid scaling laws were obtained from these results that describe the development and stability of the structured flow field. Schematic diagrams, charts and photographs illustrate the process, including the effects of rpm, length of stroke and valve lift on vortex structure and the effect of valve seat angle on flow field.

by A. Ekchian; D. P. Hoult
Massachusetts Inst. of Tech., Dept. of Mechanical Engineering
Rept. No. SAE-790095 ; 1979 ; 16p 18refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Sponsored by Dept. of Energy.
Availability: SAE

HS-026 861

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY

The Laser Doppler Anemometer (LDA), a new instrument capable of making non-interfering gas velocity measurements, was used to investigate the gas behavior in the cylinder of a firing engine. The necessary conditions for a real-time measurement of the gas velocity were achieved by the LDA and thereby two typical flows, squish and torch, in the cylinder of an engine under both motoring and firing conditions were measured. As seeding particles for LDA which are applicable to gas flow within a firing engine, a soil powder for air-cleaner standard test (No. 8, JIS Z 8901-1974) was found to be adequate among a number of particles tested. Having seeded the flow, an LDA consisting of a fringe-mode optical system and a frequency tracking system was found capable of the time-resolved velocity measurements of gas flows in an engine operated under motored or firing conditions. Although the squish or reversed squish flow pattern calculated for the motored operation showed a good agreement with the observed one, substantial difference was found between the measurements for the motored and firing engines, particularly during the expansion stroke. The jet flow through a torch nozzle connecting the auxiliary and the main combustion chambers was measured and found identical to that calculated for the motored operation, but a distinct difference in the torch flow patterns was found between the motored and firing operations. The optical technique is shown to be applicable to research on a firing engine; these experimental results should be confirmed quantitatively by other instrumentation or theoretical estimations. Cross section diagrams illustrate the system.

by T. Asanuma; T. Obokata
Tokai Univ., Dept. of Mechanical Engineering; Gunma Univ., Dept. of Mechanical Engineering
Rept. No. SAE-790096 ; 1979 ; 12p 7refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 862

USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION

Improvments in transducers and data acquisition techniqu have provided increasing confidence in the magnitude of hig speed digital recorded cylinder pressure data. Techniques fo determining the correct phasing of these data with respect t crank angle have hitherto produced less reliable results. Bot amplitude and phasing are critical for determining such informa tion as indicated mean effective pressure (IMEP) and heat re lease rate in an engine cylinder. In some engines such as th direct-injection diesel, the IMEP must be accurate to 1%. new phasing technique is described which involves transmissio of microwave energy through the spark plug hole and into th cylinder of a motored engine. At certain piston positions, sym metric about minimum volume, microwave resonances occu These resonances are recorded on an oscilloscope screen alon with the one-degree pulses generated by the crankshaft. Analy sis of these recorded data yields pressure-crank angle phasin information accurate to the order of plus or minus 0.1 degre CA for open-chamber engines. Two production open-chambe gasoline engines and one divided-chamber diesel engine wer tested using this technique. A short computer program is give which aides the user in performing the required calculations t determine the pressure-crank angle phasing for a particular s of microwave data. It is noted that results of using the tech nique in a divided-chamber indirect-injection diesel engine wer disappointing, but it is believed that a modified technique woul improve this engine's probe response.

by John H. Lienesch; Mark K. Krage
General Motors Res. Labs.
Rept. No. SAE-790103 ; 1979 ; 12p 16refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 863

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)

A new type of speed reduction device was developed to driv an auxiliary power unit by a small gas turbine engine with speed of up to 86,000 rpm. The device features a traction driv system with planetary roller arrangement. In the traction driv system, power is transmitted by the tractive force generate between the rolling elements. The device has the potential t provide superior efficiency at a lower noise level over conver tional gear system, especially at a high rotating speed rang Transmission efficiency of 96% was evaluated for this unit at a input power of 22 kW. The evaluation was based on the frictio torque measured over the speed range of 50,000-65,000 rpm The major loss of this system was identified empirically as du to the sliding friction of the carrier. Further efforts to improv efficiency should be directed toward modification of the carrie configurations. It was concluded that excess oil supply in th race ways causes a considerable drop in torque capacity an increased churning loss in the traction system.

by Kenya Nakamura; Akira Sato; Hiroshi Okano; Tatsuro Sasaki
Toyota Motor Co., Ltd.; NACHI-Fujikoshi Corp.
Rept. No. SAE-790106 ; 1979 ; 12p 4refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 864

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE

General Motors' analytical and experimental programs are outlined for evaluating air bearing usage in vehicular gas turbines. Elimination of oil from the hot section of the engine, very low running losses and potential cost reductions are incentives to develop air bearings for the high speed rotors of automotive gas turbines. Low air bearing stiffness, start-stop wear and high starting torque are design challenges in this application. Air bearing operation was demonstrated in engine dynamometer tests. A better understanding of the many factors which affect the performance of cantilevered-leaf air bearings has been realized through extensive rotor dynamics rig testing coupled with development of bearing analysis computer programs. Measured running losses of the air bearing are much lower than those of the oil jet lubricated ball bearing it is replacing. Increasing leaf thickness, leaf-housing attachment angle, leaf free radius and eliminating the clearance between the leaf beam and housing slot increased the bearing stiffness.

by Richard J. Trippett
General Motors Res. Labs., Power Systems Dept., Warren, Mich.
Rept. No. SAE-790107 ; 1979 ; 12p 12refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 865

CERAMICS IN ROLLING ELEMENT BEARINGS

The feasibility of using hot pressed silicon nitride (HPSN) for rolling elements and for races in ball bearings and roller bearings was explored. HPSN offers opportunities to alleviate many current bearing problems including DN and fatigue life limitations, lubricant and cooling system deficiencies and extreme environment demands. The history of ceramic bearings and the results of various element tests and bearing tests in rigs and in a turbine engine were reviewed. The advantages and problems associated with the use of HPSN in rolling element bearings are outlined. Among the advantages are low specific gravity, outstanding fatigue life, attractive lubrication (and non-lubrication) characteristics, low thermal conductivity, wide thermal stability range, low heat and noise generation, electrical nonconductivity, and excellent corrosion resistance. The problems in HPSN use include those of availability of material, machine ability for acceptable surface quality, quality measurement and control, and requirement for further information, such as load-life relationships, material characterization, and design modifications.

by Charles F. Bersch; Philip Weinberg
Naval Air Systems Command, Washington, D.C.
Rept. No. SAE-790108 ; 1979 ; 8p 6refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 866

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES

Oil-lubricated compliant foil bearings and rigid oil bearings were studied in comparison with an air-lubricated compliant foil bearing in a program to produce a gas turbine engine which would provide acceptable emissions, improved fuel economy, and competitive performance, reliability and manufacturing cost compared to conventional engines. Two years of testing have shown that the foil air bearing can meet load and temperature performance requirements. Work is continuing on extending operating life by improvements in foil bearing materials, welding, conformity, and surface coatings. The bearing has the potential for meeting the 1200 degrees F and low power loss needs of future engines. Areas for further investigation are outlined.

by Stanley Gray
Mechanical Technology Inc.
Rept. No. SAE-790109 ; 1979 ; 20p 8refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by Dept. of Energy, National Aviation and Space Administration/Lewis Res. Center, and Chrysler Corp.
Availability: SAE

HS-026 880

ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT

In an assessment of transportation fire safety efforts, emphasis is placed on Federal government efforts, particularly those by the Dept. of Transportation (DOT). Pertinent information was gathered from a review of public and private sector fire safety programs related to transportation, data banks (materials and accident statistics), and regulations, standards, specifications, and guidelines. Government and industry efforts involved Urban Mass Transportation Administration, Federal Railroad Administration, Federal Aviation Administration, National Hwy. Traffic Safety Administration, Coast Guard, Office of the Secretary of Transportation, DOT Res. and Special Programs Administration, Federal Hwy. Administration, National Railroad Passenger Corp., National Bureau of Standards, National Aeronautics and Space Administration, National Fire Prevention and Control Administration, National Transportation Safety Board, American Public Transit Assoc., Union Internationale des Transports Publics, material manufacturers, and material users. Both material and statistical data bases were explored. Findings indicated that standards, guidelines, specifications, and recommendations differ considerably in terms of function and impact on the community. They are frequently misinterpreted and are sometimes erroneously used interchangeably. Appended are a bibliography of fire safety literature and a survey of DOT fire safety projects.

by W. T. Hathaway; I. Litant
Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. UMTA-MA-06-0051-79-4; DOT-TSC-UMTA-78-47 ; 1979 ; 143p 266refs
Rept. for Jan-Jun 1978.
Availability: NTIS

best copy available

HS-026 881

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT

Experiments were conducted in Mississippi, California, and Oregon to test the effectiveness of speed control signs in rural school zones and small communities on high-speed two-lane highways. Test signs included existing signs, a "reduced speed ahead" sign, speed limit and "reduced speed ahead" signs coupled with hazard identification beacons, and a speed violation sign activated by a speeding driver. Roadside interviews were conducted, and a questionnaire was administered to determine the effectiveness of each sign in increasing safety and improving driver awareness of potential hazards. The questionnaire booklet provided information on public reaction to and understanding of signs. The combination of signs and hazard identification beacons and the speed violation sign provided the most substantial improvement in reducing speed and increasing awareness of roadside conditions for school zones and small communities. A wide variability in response to new signs persisted from site to site, the improvement ranging from 2-10 mph. The combination of signs was not always more effective than individual signs with hazard identification beacons. The speed violation sign, when added to signs with hazard identification beacons, resulted in no additional improvement at some sites. Signs without hazard identification beacons were inadequate in informing drivers of existing speed limits. Driver opinions indicated that effective speed control signs must be used in addition to the establishment of reasonable speed limits and strict enforcement in order to obtain a high degree of safety in rural school zones and small communities. The questionnaire booklet is appended.

by Joseph S. Koziol, Jr.; Ann R. Fulchino; Peter H. Mengert; Gerald Stewart
Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142; Federal Hwy. Administration, Office of Res., Washington, D.C. 20590
Rept. No. FHWA-RD-79-20; DOT-TSC-FHWA-79-1 ; 1979 ; 155p 8refs
Rept. for May 1976-Jun 1978.
Availability: NTIS

HS-026 882

THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION

A study evaluated the effectiveness of negligent operator hearings in which probation was replaced with the imposition of "no action". Of 6,489 California drivers who attended negligent operator hearings, 1,247 or 19% were considered high risk and were eliminated from the "no action" hearing program. The remaining 5,242 drivers were randomly assigned to either the group receiving license status as recommended (standard treatment) or the group with no action taken on their licenses (experimental treatment). There were no statistically significant driver record differences between the two groups 12 months prior or 12 months subsequent to treatment. The possiblility remains that removal of departmental actions from the individual hearing setting may have had a detrimental effect. Societal savings associated with the nonsignificant decrease in fatal and injury accidents for drivers in the "no action" group may result in a positive net financial impact for an implemented "no action" program. Analysis of low and high risk group characteristics suggests that the high-risk group did not have a higher accident expectancy than the nonhigh-risk group. Final program implementation recommendations are awaiting the outcome of a related study dealing with probation by mail (action without hearing vs. hearing without action). Procedural information and data are appended.

by Marilee E. Garretson; Raymond C. Peck
California State Business and Transportation Agency, Dept. of Motor Vehicles, Sacramento
Rept. No. CAL-DMV-RSS-79-69 ; 1979 ; 32p 17refs
Availability: Corporate author

HS-026 883

PASSIVE RESTRAINT SYSTEMS IN THE U.S.A. BASIS FOR THE DECISIONS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION REACHED WHEN WORKING ON NEW LEGAL REGULATIONS (PASSIVE RUCKHALTESYSTEME IN DEN USA. ENTSCHEIDUNGSGRUNDLAGEN DER AMERIKANISCHEN VERKEHRSSICHERHEITSBEHORDE FUR NEUE GESETZLICHE REGELUNGEN)

Decision-making principles underlying the National Hwy. Traffic Safety Administration (NHTSA) action in introducing passive restraint systems are described from the perspective of automotive engineering, medicine, and economy, and their importance for the Federal Republic of Germany is assessed. The United States will gradually institue passive restraints for passenger cars in the early 1980's as a substitute for the obligatory use of safety belts. In contrast to so-called active restraint systems such as the safety belt, passive systems are designed to be automatically ready for use or automatically activated by special mechanical devices. Passive systems include impact cushions, passive safety belt systems which surround vehicle occupants, combined safety belt/knee cushion units, and air bags activated and inflated upon impact. The effectiveness of restraint systems for passenger car occupants in case of an accident is measured by their ability to prevent fatal injuries, diminish the severity of other injuries, or prevent all injuries. Passive restraint systems are not considered to be the safety equipment of the future in the Federal Republic of Germany, with the possible exception of the safety belt-knee cushion system. Possible adverse effects of air bags, and economic factors in the use of passive restraints are noted.

by Bernd Friedel; Rudolf Krupp; Herbert Loeffelholz
Publ: ATZ Automobiltechnische Zeitschrift v81 n4 p177-9 (Apr 1979)
1979 ; 16refs
Translated from German (original 3p; translation 8p). Text in English and German.
Availability: Reference copy only

HS-026 884

ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)

The production of ethanol from biomass (foodstuffs and othe plants) is discussed as an alternative fuel. Of the nonpetroleum based alternative fuels under consideration in research project alcohols such as methanol and ethanol appear to offer the mos promising characteristics. Methanol represents the optimum so lution in countries with rich coal, natural gas, or woodlan resources and highly-developed industrial technology. Ethan is the fuel of the future in countries with dense vegetation and more agriculturally-oriented economy. The amount of biomas required to produce one liter of ethanol by fermentation an distillation ranges from 3-14 kg, depending on the type of biomass. Plants in Latin America and Africa (sugar cane, manioc, and milo), plants in the Federal Republic of West Germany (sugar beets), and the world harvest yield (rice, corn, grain, and potatoes) are examined in relation to the generation of ethanol from biomass. Economic and technological conditions that affect ethanol production are noted.

by Winfried Bernhardt
Publ: ATZ Automobiltechnische Zeitschrift v81 n4 p151-2, 157 (Apr 1979)
1979 ; 17refs
Translated from German (original 3p; translation 11p). Text in English and German.
Availability: Reference copy only

HS-026 885

SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION

Technological processes involved in the generation of synthetic fuels are addressed in relation to President Carter's energy plan for the rapid development of fuels from domestic sources. The President has called for the establishment of an Energy Security Corp. to oversee the spending of $88 billion over a 12-year period, for promoting the production of fuels from domestic resources to replace 2.5 million barrels per day of imported petroleum. Most Federal funds have been channeled to coal conversion projects, because coal is the most abundant fossil fuel resource in the United State and coal conversion technology is more advanced than other synthetic fuel techology. A leading contender in coal gasification competition is the German-developed Lurgi gasifier which employs a pressurized fixed-bed reactor and works well with noncaking coal like that found in North Dakota and western United States. The Koppers-Totzek gasifier, an entrained-bed reactor operating at atmospheric pressure, can be used with almost any type of coal. The Winkler gasifier is a fluidized-bed device that operates at atmospheric pressure. Several projects supported by the Dept. of Energy include a fluidized bed process, "Hygas", developed at the Inst. of Gas Techology, "Synthane", developed by the Bureau of Mines, and the Texaco gasifier where coal is pumped in as an aqueous slurry and gasification takes place in a high-pressure concurrent reactor with ash discharged as slag. Coal can be transformed into liquid fuels by pyrolysis or by indirect and direct hydroliquefaction. Shale oil and coal liquid are deficient in hydrogen and require considerable upgrading (including severe hydrotreating) to be suitable feedstocks for conventional refineries. From a testing standpoint, the most advanced surface retorting processes in the United States are Oil Shale Co.'s TOSCO II process, Union Oil's steam gas recirculation process, and Development Engineering's Parahoe process. In-situ shale processing technology developed by Occidental is reported, potential sources of synthetic fuels are noted, and cost and environmental impacts of synthetic fuel technology are considered.

by Ward Worthy
Publ: Chemical and Engineering News v57 n35 p21-6, 28 (27 Aug 1979)
1979
Availability: See publication

HS-026 886

OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS

The Operation Lifesaver program, developed by the Union Pacific Railroad to reduce fatalities at railroad-highway crossings, is described. In the typical railroad-highway accident, a motorist driving at a moderate speed (usually less than 25 mph) is involved even if the warning device at the crossing is properly functioning. Operation Lifesaver programs implemented in Idaho, Nebraska, Alabama, Georgia, Kansas, Missouri, and Utah have reduced fatalities by 28% to 64%. Operation Lifesaver has been recommended for nationwide adoption by the National Transportation Safety Board. It is based on education of the general public, enforcement of safety laws, engineering improvements, and evaluation of progress with regard to effectiveness and continuity. Planning for the nationwide effort has involved the cooperation of government and private sector organizations. Operation Lifesaver has been endorsed as a priority concern by the National Assoc. of Women Hwy. Safety Leaders, American Driver and Traffic Safety Education Assoc., Assoc. of American Railroads, Federal Hwy. Administration, Federal Railroad Administration, National Hwy. Traffic Safety Administration, National School Transportation Assoc., and the Department of Transportation. As the result of planning efforts, California and North Carolina have initiated Operation Lifesaver programs and 14 more states have expressed interest.

by Vincent L. Tofany
Publ: Traffic Safety v79 n8 p8-9, 36 (Aug 1979)
1979
Availability: See publication

HS-026 887

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...

Testimony was presented by Philip M. Besuner, a representative of a California consulting firm before an Occupational Safety and Health Administration (OSHA) hearing panel dealing with multipiece tire wheels. Effective promulgation of proposed OSHA standards can potentially prevent 68% of accidents and 84% of fatalities associated with multipiece wheels. The cost of implementing the standards appears insignificant to moderate and therefore more cost-effective than multipiece rim replacement with single-piece rims. The cost of replacing multipiece rim components is unjustified due to lack of evidence that a change in rim type will reduce the small rate of fatalities. Risk posed to society by the multipiece rim is so low that a factor-of-three increase in the number of known accidents will not significantly affect the validity of this conclusion. Most risk related to using multipiece rims is centered around maintenance activities. Eighty percent of mishaps occur during maintenance and the fatality rate for these mishaps exceeds the moving vehicle fatality rate by three times. Recognizing that maintenance tire specialists are exposed to the risk of wheel-related mishaps for periods of about 20 or 30 minutes per wheel in maintenance and only 20% of mishaps are fatal, their exposure to risk (per tire change or per unit time) is less than the risk accepted when they drive to work or travel on commercial aircraft. Any safety-intended replacement of multipiece wheels with single-piece wheels should be implemented only when a substantial decrement in risk can be shown, sufficient to offset the resulting cost and disruption. Single-piece rims suffer from tire bead explosions that virtually never occur on multipiece rims, but side rings of single-piece rims do not exposively separate. Costs per forestalled fatality of various highway safety measures are compared with those of mandating single-piece rims (from $506 to $5.8 million vs $125 million). Procedures to follow in minimizing the risk of injury associated with explosive separation are identified.

Publ: Tire Review v79 n8 p32, 35 (Aug 1979)
1979
Availability: See publication

HS-026 888

CHILD AUTO RESTRAINT DESIGN PRINCIPLES

Anatomical considerations and general principles of occupant restraint in the car crash environment are explored, with emphasis on the protection of children, and design criteria and typical performance problem areas in child restraint systems are discussed. A major problem in the design of necessary special restraint systems for children is that of providing a device compatible with a child's size and anatomical features. Overriding criteria for child seat designs relate to their crashworthiness, specifically involving structural integrity, dynamic interaction with the adult seat, proper use of adult restraints to secure the child seat and load distribution, as well as considerations of limitation of body motions, comfort, usability, and cost. Many prototype systems which apply the preceding restraint criteria fail to anticipate the magnitude of loads produced in a typical dynamic crash test and the effect of loads on the seat structure. Common problems with prototype designs are structural collapse and rupture, concentrated loading of the occupant, and high occupant accelerations due to harness and padding inadequacies. The capability to design and manufacture effective and practical child restraint systems is reflected in some systems available on the market. Child restraint provisions embodied in Federal Motor Vehicle Safety Standard 213 are not effective in eliminating structurally deficient systems from use. A dynamic test procedure is needed to produce the appropriate type of loading for restraint system evaluation. Revisions to Standard 213 should reflect real world conditions in test crash pulse severity and direction, and should provide effective but not overly restrictive performance criteria, promotion of widespread usage, and cost-effectiveness.

by John W. Melvin; Richard L. Stalnaker
Publ: Journal of Products Liability v2 p43-57 (1978)
1978 ; 12refs
Presented at Southeastern Conference on Safe Products Design and Failure Analysis, Durham, N.C., 18-19 Nov 1977.
Availability: See publication

HS-026 889

ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR

The development of design policies for the horizontal alignment of road curves is viewed from a historical perspective, and empirical studies of driver-vehicle behavior on road curves are examined. Particular consideration is given to assumptions made about vehicle speeds, to criteria for determining safe speeds on highway and intersection curves, to the super-elevation associated with different degrees of curvature, and to criteria for effecting transitions in curvature, super-elevation, and pavement width. It is suggested that adoption of the assumed design speed concept in the mid-1930's diverted attention away from study of the actual behavior of drivers on road curves and distorted the investigation of such questions as safe speed super-elevation/curvature relationships. Literature on empirical observations of driver-vehicle behavior on both highway and intersection curves is critically reviewed. Evidence of deviations from the idealized behavior assumed in current design policies is pointed out, and several previous interpretations of data are criticized. Necessary research is outlined.

by M. C. Good
University of Melbourne, Dept. of Mechanical Engineering, Vic., Australia
Rept. No. AARB-SR-15 ; 1978 ; 103p 186refs
Part of Project 046, "The Interaction Between the Driver, the Vehicle and the Road," sponsored by Australian Rd. Res. Board.
Availability: Australian Road Res. Board, 500 Burwood Hwy., Vermont, Vic. 3133, Australia

HS-026 890

COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS

The history, rationale, and implementation of legislation for compulsory blood alcohol tests for adult road crash casualties brought to Victoria (Australia) hospitals are reviewed. The legislation permits drinking drivers admitted to casualty departments to be identified and prosecuted, and physicians can obtain blood alcohol test results for road crash casualties without the threat of litigation. Drinking drivers and nondriver casualties with alcohol problems can be directed to appropriate re-education or rehabilitation programs (compulsory for drinking drivers). In the first three years of testing, 27.1% of 21,863 male driver casualties had blood alcohol concentrations (BAC's) over the legal limit of 0.05g/100mL, and 13.7% had BAC's over 0.15g/100mL. BAC's in 8.7% of 9,187 female driver casualties exceeded 0.05g/100mL; 3.7% of these drivers had BAC's over 0.15g/100mL. Nondrivers had a slightly lower incidence of elevated BAC's. Implementation of further drink-driving countermeasures, expansion of services for managing alcohol problems, and development of a national policy directed at preventing alcohol abuse are recommended.

by Frank McDermott; Peter Strang
Publ: Medical Journal of Australia v2 n14 p612-5 (30 Dec 1978)
1978 ; 24refs
Availability: See publication

HS-026 891

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT

Accident, injury, and speed data collected in Victoria, Australia, were analyzed to determine the effectiveness of the 100km/h rural speed limit in reducing the number of road accidents and persons killed or injured. Free speed data were obtained by the Road Safety and Traffic Authority at 12 sites from 1972 through 1976. Analysis of data suggested that a lower proportion of vehicles exceeded 100 km/hr areawide with the introduction of the reduced absolute speed limit in 1974. Throughou 1975-1976, however, this proportion increased. Adverse weather and seasonal effects may have affected some results, the latter being of particular importance when comparing speed measurements in 1973-1974. The general trend in reported casualties was toward a decrease in 1974 and a subsequent increase in 1975 for high and low speed zones. The incidence of single-vehicle accidents may have been more affected by changes in trave speed than that of multivehicle accidents. Largest percentage decreases for single-vehicle and multi-vehicle accident types in 1974 occurred on high speed zones of divided highways. The ratio, vehicle occupants killed plus injured admitted to hospitals/ vehicle occupants involved, was calculated for the 1973-1975 period as a means of assessing changes in personal injury severity. Contrary to expectation, there was an increase in the ratio over the 3-year period for high and low speed zones. In general, no causal link between vehicle free speed and accident occurrence could be established. Supporting tables and figures are provided. Information relevant to seasonal influences on free speed measurements is appended.

Road Safety and Traffic Authority, Vic., Australia
1978 ; 49p
Sponsored by Australia Commonwealth Dept. of Transport.
Availability: Road Safety Information Service, G.P.O. Box
1839Q, Melbourne, Vic., 3001 Australia

HS-026 892

1978 TRAFFIC ACCIDENT FACTS: AN ILLUSTRATED ANALYSIS OF ACCIDENT RECORDS [FLORIDA]

Detailed data on traffic accidents in Florida during 1978 are tabulated. There were 326,199 traffic accidents involving 596,423 drivers; 183,324 persons were killed or injured in 116,880 accidents and 2,085 fatal accidents claimed the lives of 2,305 persons. Pedestrians comprised 3% of all persons injured and 24% of all persons killed in traffic accidents. The 1978 mileage death rate of 3.2 deaths per 100 million vehicle miles of travel represented the first increase in three years. Of pedestrians killed, 20% were not crossing at intersections or crosswalks. More than two-thirds of all persons killed, 64% of all drivers in accidents, and 78% of all drivers in fatal accidents were males. Fatalities increased by 12% from 1977 to 1978 and accidents increased by 14%. Although 64% of all accidents occurred in urban areas, 61% of all traffic deaths occurred in rural areas. The ratio of injured to killed was 79:1. Seat belts were available in 88% of all motor vehicles involved in accidents, but only 14% were in use at the time of accidents. Of 1,295 persons killed who had seat belts available, only 6% were using them.

Florida State Dept. of Hwy. Safety and Motor Vehicles, Bureau of Records and Training
1979? ; 33p
Availability: Corporate author

HS-026 893

SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)

Actual on-road and wind tunnel evaluation work carried out by Transport Canada to estimate fuel savings and benefits associated with the use of truck drag reduction devices is reported. The primary source of aerodynamic drag on trucks is a pressure force caused by the impact of air on the front of a moving vehicle. A cab-mounted drag reduction device deflects air at an angle over the trailer or van body projecting above the cab. Skin drag, caused by friction between air and vehicle sides, is less significant. In addition to cab-mounted drag reduction devices, there are trailer/van-mounted devices and cab/van gap-mounted devices. Fuel savings attributable to drag reduction equipment are related to vehicle load. It is recommended that users request manufacturer data on the basis of gallons of fuel saved per 100 miles rather than on percentage gains. Guidelines are offered to facilitate the selection of a drag reduction device, to maximize fuel savings, and to check the performance of a particular device under fleet conditions. Factors affecting fuel economy are noted, including wind conditions, vehicle load, differences in performance of unequipped vehicles, driver habits, and traffic conditions.

Canadian Trucking Assoc., 130 Albert St., Suite 300, Ottawa, Ont. K1P 5G4, Canada; Transport Canada, Strategic Studies Branch; Davis, Eryou and Associates Ltd.

24p
Text in English and French. Subcontracted to Davis, Eryou and Associates Ltd. by Transport Canada.
Availability: Corporate author

HS-026 894

CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY

Ways of improving the use of child restraints after 3 years of age, by developing more acceptable devices, are examined. Intended as a guide for use by administrators, manufacturers, and others, the report covers the selection of protective devices for children (chairs with harnesses, child harnesses, belts designed for adults, booster cushions, and cushions and chaises). Any child restraint should be adjusted to have a minimum slack. Retractors are extremely beneficial in reducing slack. Laboratory testing indicates that booster cushions are satisfactory if they can be restrained in crashes by the child's weight or by suitable anchoring devices. The use of booster cushions with child harnesses or seat belts greatly increases their acceptability. Legal requirements for child restraints are discussed. Narrative, tabular, and graphical information on various child restraints, including booster cushions, is appended.

by D. C. Herbert; D. Cutting
Traffic Accident Res. Unit, Dept. of Motor Transport, New South Wales, Australia
Rept. No. 2/78 ; 1978 ; 42p 11refs
Sponsored in part by Commonwealth Government of Australia (Proj. NMT-77/3, Occupant Protection).
Availability: Corporate author

HS-026 895

CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")

An in-depth study of 149 children, aged less than 8 years, who were ostensibly restrained in preparation for crashes, and who actually experienced collisions while traveling in passenger cars, is presented. Crashes occurring within an 80-km radius of the center of Sydney, Australia between Jan 1974 and May 1975 are included. The speed limit was 60 km/hr or less at the scene of 106 (87%) of the crashes. Collision forces were from the frontal direction in 56 (46%) of the crashes. Vehicle damage intruded into the occupant compartment in 57 (47%) of 122 case vehicles and the vehicle overturned in 10 (8%) of the crashes. Most study participants (58%) were less than three years old, and about two-thirds of the sample were traveling in the rear seat. *At least 37 case occupants* were ejected from their restraints, or had them detach from the vehicle, and four occupants were ejected from the vehicle. Most child restraints involved in the accidents were not approved by the Standards Assoc. of Australia. Children in restraints approved by this association received nothing worse than minor injury. Similiarly, restrained bassinets gave moderate protection. Seat belts supplied for adults tended to be worn very loosely by children and, in that condition, did not provide adequate restraint. Most injuries were to the head following contact with car interiors. Recommendations to improve crash protection for children are offered. Appendixes note cases involving moderate injury or worse, cases involving large vehicle deformation ratings, and types of child restraint devices.

by B. A. Vazey
Traffic Accident Res. Unit, Dept. of Motor Transport, New South Wales, Australia
Rept. No. 7/77 ; 1977 ; 61p 15refs
Availability: Corporate author

HS-026 896

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES

The Italian Electricity Board's program of research, development, and demonstration to explore the use of electric vehicles is examined. The program includes general studies to evaluate the potential of electric vehicles in various areas of road transport in relation to 1980-1990 technological developments; study of the development of electric vehicles and related components for specific application to urban-suburban areas; and study of infrastructures necessary for large-scale urban-suburban use of electric vehicles. Emphasis is placed on the near-term application of electric vehicles, Board actions relevant to the development of city vans, Board demonstration programs on electric van fleets, and Board methods and instrumentation for tests on electric vehicles and their components. It is envisioned that widespread use of electric vehicles will be beneficial for the energy situation and the environment, and that overnight battery recharging will contribute to balancing the electric load profile. Laboratory and on-the-road tests are planned by the Board to improve vehicle and battery performance. Photographs and specifications are provided for electric vehicles under study.

by A. Bossi; P. Menga; L. Paris; M. Sforzini
Italian Electricity Board
Rept. No. SAE-790113 ; 1979 ; 11p
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 897

THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME

Performance, reliability, and maintenance and running costs of 62 battery electric delivery vans, supplied by three manufacturers and used daily in the Greater London area, are being assessed over a 3-year period to compare their operation with closely equivalent conventional vehicles. The primary purpose is to obtain independent operational experience covering a wide variety of suitable applications over an extended period and to provide reliable factual information about the performance of electric vehicles in normal daily use with typical drivers and loads. Significant elements of the London electric delivery van assessment scheme are monitoring, collection of daily operating data, consideration of vehicle maintenance work and downtime, and establishment of the scheme's scientific validity. Results of vehicle assessment are to be presented in a separate paper.

by G. W. Wicken
Department of Industry, Vehicles Div., United Kingdom
Rept. No. SAE-790111 ; 1979 ; 14p 15refs
Technical Paper Series. Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 898

HELMET SUPPORTER SEES FLAWS IN OBJECTIONS

An article dealing with motorcycle helmet use, "Easy Rider -- Hard Facts: Motorcycle Helmet Laws," by Pearl K. Russo (New England J. of Medicine) is reviewed. Facts are gathered from a number of studies that support the use of motorcycle helmets as a safety measure. Helmets in one form or another have been used as protective devices for thousands of years. According to a British study, with increased use of helmets in the 1960's, the fatality rate from accidents involving head injuries dropped about 50%. A 1970 study in Sacramento, Calif., based on police reports, death certificates, and hospital records, supports the value of helmets in saving lives. Four objections to helmet use are refuted: helmets increase the risk of neck injuries; helmets reduce the cyclist's peripheral vision, thereby creating a hazard; helmets reduce the cyclist's ability to hear other vehicles in traffic; and helmet weight increases rider fatigue, thus causing accidents. The constitutionality of helmet use laws is considered, along with societal costs of motorcycle injuries.

Publ: Traffic Safety v79 n8 p18 (Aug 1979)
1979
Availability: See publication

HS-026 899

TRUCK ESCAPE RAMPS: EXITS TO SAFETY

The design of truck escape ramps is addressed, with reference to the construction of ramps in Colorado, Oregon, Idaho, Washington, Utah, New Mexico, Texas, California, Virginia, West Virginia, Pennsylvania, North Carolina and Tennessee. Highway departments in many parts of the country are building ramps at key locations where truck drivers have been killed i run-off-the-road crashes. Most ramps follow a similar desig pattern. Signs on a downgrade alert drivers of trucks wit failing brakes to a strip of loose gravel or sand which allow tires to sink in and thereby slow the vehicle. To further slow the truck, ramps are built on an upgrade, except in some area where terrain necessitates that ramps go downhill. Ramps rang in length from 250 to 1,200 feet. Costs of installing ramps var from $8,000 for a 250-foot ramp in Pennsylvania to $245,000 fo a 1,200-foot ramp in Oregon. Terrain is a major factor in con struction costs. A survey by "Traffic Safety" magazine of 1 states and one Canadian province, indicates that 12 states hav escape ramps and find them to be worth the cost. Procedure followed by various states in the design and construction c ramps are described.

by Robert B. Overend
Publ: Traffic Safety v79 n8 p22-4, 36-9 (Aug 1979)
1979
Availability: See publication

HS-026 900

EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS

The cohesiveness of radial tire compounds incorporating SBR (styrene butadiene rubber) and BR (butadiene rubber) polymers is examined in relation to the effect of adding minor amounts of a labile crosslinked SBR polymer. Raw polymer blends were prepared and analyzed in terms of Mooney viscosity and cohesiveness. The effect of mixing conditions on cohesiveness and the rolling resistance of tires were evaluated. It was determined that for blends in all combinations of three common polymers (SBR-1778, SBR-1502, and BR-1203) the necessary cohesiveness for building radial tires can be obtained by adding minor amounts of SBR-LX, a labile cross-linked terpolymer containing 23.5% styrene, butadiene, and a small amount of a monomer with tertiary amine groups. The quality of SBR-LX required to reach a satisfactory level of cohesiveness depends on polymers used in the blend, equipment used to process the compound, and mixing procedures. Experiments using Dunlop's rotary power loss machine indicate that compounds containing a fraction of SBR-LX are likely to produce tires with lower rolling resistance.

by G. J. Briggs; J. M. Holmes; Y. K. Wei
Publ: Elastomerics v111 n8 p30-7 (Aug 1979)
1979 ; 4refs
Presented under the title, "Effect of Labile Crosslinked SBR on the Green Strength and Hysteresis of Radial Tire Compounds," at meeting of American Chemical Society, Rubber Div., Atlanta, 27-30 Mar 1979.
Availability: See publication

HS-026 901

BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS

The performance of nitrile rubbers with polymerization-bound antioxidant in automobile engine compartments is examined in relation to heat aging performance. Nitrile rubbers, used in oil and fuel resistant applications since the 1930's, are produced by emulsion polymerization from butadiene and acrylonitrile. They have a balance of cost, processing ease, physical properties, oil and fuel resistance, and gas permeation resistance that makes them desirable for use in a number of applications. Bound antioxidant nitrile rubbers have undergone extensive laboratory and field performance evaluations in different automotive parts since 1975 to prove their value to the industry. They are used principally where conventional nitrile rubbers do not meet upgraded performance requirements, as replacements for epichlorohydrin copolymers (ECO) and polyacrylates (PA) for cost reduction, where performance deficiencies occur with extended field application history, and where properties of ECO and PA are not required but no other suitable material was previously available. Specific automotive applications include seals, fuel systems, and fuel hoses. Procedures and results of sour gasoline testing of various polymers is described. Only fluoroelastomer and bound oxidant nitrile rubbers lasted six weeks in this test. The service performance of bound antioxidant nitrile rubbers is consistently better than indicated from laboratory evaluations, and it is expected that the value of these polymers will appreciate considerably as price increases and petroleum shortages exert pressure on other specialty polymers made from more exotic monomer systems.

by James W. Horvath
Publ: Elastomerics v111 n8 p19-26, 62 (Aug 1979)
1979 ; 13refs
Presented at a meeting of the International Inst. of Synthetic Rubber Producers, Inc., Vancouver, 20-25 May 1979.
Availability: See publication

HS-026 902

WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)

The delayed pulse wiper motor system devised by General Motors is described. The system solves the annoying problem of mist by providing a special delay mode, in addition to standard wiper operation at low, medium, and high speeds. The delay can be adjusted from a minimum very low speed operation to a maximum of approximately 12 seconds between wiper strokes, or any delay period between the two. System elements include a pulse relay, timing device, holding switch, drive cam, and override switch. The control circuit of the system is complicated and requires an orderly procedure for diagnosing problems. Repair procedures are outlined for various types of malfunction.

by Bob Cerullo
Publ: Motor v152 n2 p43-9, 72 (Aug 1979)
1979
Availability: See publication

HS-026 903

ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)

A team of researchers from the Johnson Environmental and Energy Center, working under contract to the Dept. of Transportation (DOT), investigated the effectiveness of 62 representative auto repair shops in detecting and repairing defects that had been deliberately induced in test cars. The team wanted to determine how much unnecessary and/or unsatisfactory repair work would be done. Additional information was collected regarding rates and possible billing for repairs not performed. The DOT study found that the consumer has only about a 50-50 chance of obtaining proper repair work at the correct price. There were shops that did unnecessary repairs, those that did not find the problem, and those that found the problem but used the opportunity to push other repairs. It is a known fact among auto repair shop operators that there are some incompetent and dishonest mechanics. More attention is being paid to the auto repair industry by car owners, consumer groups, and the government. One way to eliminate the dishonest or incompetent mechanic is certification. The reputable mechanic must take the initiative to earn customer confidence. He might post and/or distribute a list of principles (sample illustrated) to which he adheres in his practice. He must use the best diagnostic equipment and have the knowledge to interpret test results correctly. In addition, the auto mechanic must justify repairs to his customers.

by Bob Cerullo
Publ: Motor v152 n2 p23-30 (Aug 1979)
1979
Availability: See publication

HS-026 904

NOBODY APPRECIATES THE TIRE. FACTS ABOUT TREADWEAR

Every tire has two effective diameters: rolling (tire under load), and free (unloaded tire at rest). The difference between the two is called the contact patch, or footprint, which represents tire deflection. Overloading a vehicle, using tires too small to support the weights involved, or underinflation increases deflection to a point where the center of the tread is raised off the road surface, causing rapid outer tread wear. Overinflation causes rapid center tread wear. Tread mileage is increased substantially by maintaining recommended tire inflation pressures. A rolling tire is subjected to centrifugal, acceleration, and deceleration forces. Tire rotational speed at the instant of contact with the road surface is zero, regardless of vehicle speed; the rotational speed at the opposite point is twice the vehicle speed; fore and aft positions are at vehicle speed. The tread material, therefore, should be of uniform stiffness. Traction waves in the casing behind the contact patch occur as a result of flexing at high-speed operation. Excessive camber causes rapid outside tread wear; too little camber causes rapid inside tread wear. High-speed cornering can cause tread shoulder wear. Incorrect toe adjustment results in a tread wear pattern called feathered edge or sawtooth. Cupped, dished, or scalloped tread wear is produced by a combination of mechanical problems such as loose ball joints, shock absorbers, tie rods, and idler arm bushings. Bias ply tires characteristically display a rapid wearing of the second rib in from each tire shoulder. Wheel imbalance and excessive lateral and/or radial runout will upset normal tire tread wear. The rate of tread wear is a good yardstick for measuring satisfactory tire life, but accelerated tread wear patterns are the keys to diagnosing problems causing tire wear.

by Herb Carrier
Publ: Tire Review v79 n8 p26, 28-30 (Aug 1979)
1979
Availability: See publication

HS-026 905

THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM

Inspection procedures are outlined for the following steering and suspension components: ball joints, tie rod ends, bushings, idler arm, shocks, springs, brakes, and tires. Vehicle riding height (chassis height), a key to vehicle handling and control problems, is discussed. Steering and suspension problems caused by sagged springs are considered, including diagnosis by checking chassis height, and ways of correcting chassis height. Photographs and accompanying text are provided which illustrate typical tire wearing conditions resulting from specific suspension and steering problems. The results of combined suspension problems are discussed (loose suspension pivots plus an incorrect camber setting, worn upper control arm bushings plus toe-out condition, loose steering linkage plus an unbalanced condition). The effects on tread wear of loose wheel bearings, worn control arm bushings and idler arm, and wheel imbalance are included. Toe wear caused by incorrect toe-in or toe-out settings and camber wear caused by incorrect camber setting are depicted.

Publ: NTDRA Dealer News v42 n16 p13-9 (27 Aug 1979)
1979
At head of title: The Tire Service Specialist. Prepared by National Tire Dealers and Retreaders Assoc. Tire Service Specialist Com. Based on information from Moog Automotive Inc., St. Louis, Mo.
Availability: See publication

HS-026 906

WEIGHT REDUCTION FOR FUEL ECONOMY

A special supplement presents separate discussions concerning alternative materials and manufacturing methods for reduced motor vehicle weight (and accompanying fuel conservation), based on a symposium (SITEV) held in Geneva during May 1979. A brief overview is presented of weight reduction in vehicles. The factors influencing the increased use of magnesium base alloys are discussed, with particular reference to their cost in comparison to aluminum. The properties and performance of the various forms of carbon fiber reinforced plastics are reviewed, including pre-impregnated tapes, thermoplastic molding material, pultruded composites, non-woven fabrics, and sheet molding compound. Rynite, a new thermoplastic polyethylene terephthalate polyester for automotive applications, is described. New test procedures are outlined, aimed at improving the correlation between laboratory tests and service performance of plastics. The significant weight savings offered by use of new, thinner glazing materials are discussed, and the design and development of a range of lightweight propeller shafts are examined. Design considerations and features of a self-contained, prefilled hydraulic clutch actuator are presented as an example of a weight-saving technique. An outline is provided of the implications and essential features of the Salplex light-weight electric harness, an example of multiplex data handling systems for automotive applications. A discussion of the preceding topics by the symposium participants follows, as well as an overall review of new developments by manufacturers and suppliers of lightweight materials for automotive applications.

by P. A. Fisher; E. M. Trewin; John D. Young; C. J. Hooley; D. S. Turner; John Picard; L. G. Fisher; B. Joynes; J. H. Williamson
Publ: Automotive Engineer v4 n3 p39, 41-8, 51-7, 59-61, 63-4, 67-9, 71-2 (Jun-Jul 1979)
1979 ; refs
Availability: See publication

HS-026 907

VIRGINIA ESCORT DRIVER'S MANUAL

This manual provides information, including rules and regulations, legal requirements, safety suggestions, and reminders, to aid drivers who provide escort services for overdimensional loads (width in excess of 12 ft. but not greater than 14 ft.) on Virginia highways. An understanding of the provisions of this manual, and other safe driving rules applicable to every motor vehicle operator, is an essential requirement for certification as an escort driver and is a prerequisite for employment as such. Information is presented in the following sections: purpose of escort driver certification, general requirements for certification, certification program, safe driving practices, general regulations governing movement of overdimensional loads, duties and responsibilities of escort drivers, equipment for escort vehicles, proper escort procedures, don'ts of escort driving, emergencies, and study questions. A list of testing offices is provided.

by Martin R. Parker, Jr., comp.
Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
1979 ; 41p
Sponsored by Virginia Dept. of Transportation Safety.
Availability: Virginia Dept. of Transportation Safety, 300 Turner Rd., Richmond, Va. 23225

HS-026 908

FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)

Data are compiled from information forwarded to the General Services Administration on Standard Form 82 by all Federal agencies operating vehicles in the U.S. and overseas. The tables summarize statistical data (inventory, costs, years of operation, mileage, fuel consumption) on agency-held, interagency motor pool, and commercial (leased) vehicles. These data are further categorized by all agencies and large fleets, worldwide and domestic. Selected data on five-year trends are included. No data are available for privately owned vehicles, although their use on official business is a significant fleet operations cost factor. Vehicle types included are sedans, station wagons, ambulances, buses, trucks, and truck tractors. Energy conservation tips and a glossary are provided.

General Services Administration, Federal Fleet Management Div. (TMM), Washington, D.C. 20406
1979 ; 41p
Availability: Corporate author

HS-026 909

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)

Certain courts in Orange County, California are sending some of their DUI (driving under the influence of alcohol) drivers to the Academy of Defensive Driving (AODD) for three days of intensive training, lectures, and driving instruction. A 1977 study found that in the first year after a conviction, court-processed drivers (convicted and fined) were 78% more likely than the academy graduates to have another alcohol-related violation, 34% more likely to have an accident, 23% more likely to have a moving violation, and 40% more likely to have a license suspension. The AODD was begun in 1973 as an advanced driver training course for policemen, but it now includes individual courses for law enforcement personnel, adult DUI offenders, and juvenile DUI or open-container offenders. The AODD runs two 3-d ("Don't Drink and Drive") classes a week for three days each. There are intensive sessions of lectures, films, group discussions, hands-on driving practice through obstacles and hazards, and actual drinking-and-driving experiences that are built into the course. In each class, two people volunteer to drink until their blood alcohol level reaches .1, the legal level of intoxication. They then attempt maneuvers on the driving course which they had previously been practicing while sober. The volunteers are videotaped in the realistic drinking situation (barroom atmosphere) as well as in the driving environment. The videotapes are viewed and discussed by the entire class at the conclusion of the course.

by Jeri Rood
Publ: Driver v13 n3 p0-1, 3-7 (Aug 1979)
1979
Availability: See publication

HS-026 910

TRAILER WEIGHT AND HITCHING UP

Information is provided by the Ford Motor Co. on the proper loading of recreational trailers. The load should be evenly distributed and should never exceed the manufacturer's rated towing capability of the towing vehicle. When loading the trailer, two considerations are gross trailer weight (weight of the empty trailer plus all trailer options and trailer's payload), and tongue weight (weight directly on the hitch ball, i.e. weight a trailer adds to the rear of car or pickup). It is essential that neither of these weights exceeds the towing vehicle capability. Other reminders include keeping the trailer's center of gravity low, storing heavy articles as near the floor as possible and lightweight items at a higher level, distributing the weight evenly, balancing the load from side to side, carrying only essential items, and securing all doors and drawers. For pulling lightweight Class 1 trailers with applicable vehicles, a weight-carrying ball hitch should be used. A load-equalizing hitch should be used for trailers weighing over 2000 lb. No more than 10% to 15% of the gross trailer weight should be on the hitch ball. An anti-sway device, built into the hitch or installed separately, is recommended for trailers over 3500 lb. Safety chains and a breakaway switch to activate the trailer's brakes are important if the coupling unit or hitch ball should fail. Trailer braking systems that have a direct hydraulic brake fluid connection with the towing vehicle's braking system are not recommended, since these increase the towing vehicle's stopping distance.

Publ: Driver v13 n3 p10-1 (Aug 1979)
1979
Availability: See publication

HS-026 911

MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE

No-fault insurance is not seen as a viable policy for motorcyclists unless the financial risk is spread among those who inflict the damage, i.e. the automobile drivers. It is a fact that 75% of car vs. cycle accidents are the fault of the automobile driver. The cyclist has his rates raised substantially because he has more serious and expensive personal injury and vehicle damage than that sustained by the motorist even though he was not at fault. Despite the difficulty and expense in obtaining motorcycle insurance, buying insurance is the smart thing to do. The attitude of most motorcyclists is probably that they wear helmets because they want to, not because a law says so. Those who say they will not wear a helmet because they feel helmets are dangerous have made this decision based on emotion, not fact. A possible explanation for the cause of accidents in which a car strikes a motorcycle at an intersection is that the motorcycle is ignored because it does not produce enough of a threat to a car driver. A motorcyclist can reduce the accident potential of events over which he has control by adopting the attitude that he is invisible to fellow motorists.

by Don Holt
Publ: Driver v13 n3 p18-21 (Aug 1979)
1979
Availability: See publication

HS-026 912

THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR

Background information on the development and characteristics of synthetic oils and lubricants is followed by a discussion of the pros and cons of their value to the car owner or driver. The four basic chemical classes from which the synthetics derive are the dibasic acid esters or diesters, the polyol esters, polyalphaolefins, and the alkylated benzenes. Overall, synthetics have the following advantages over conventional oils: increased gas mileage and prolonged engine life by decreasing engine temperature, by minimizing sludge, varnish, and acid formation, by minimizing metal-to-metal contact, and by providing quicker warm-ups; synthetics also permit longer periods between oil changes. Some questions are answered concerning the "IF" factor (synthetics' possible advantages for a particular car owner). Synthetic oils cannot be used as "break-in" oils. If a car's engine was broken in with the factory installed oil, the use of a synthetic will not void a new-car warranty. The Armed Forces use synthetics in Arctic areas because of their low-temperature qualities, but not routinely because of expense. Motorists are not generally using synthetics probably because of bad experiences with some of the earlier synthetics. In terms of economics, the 25,000 mi. cost of synthetic oil is $38.75, compared to about $38.00 for a conventional petroleum-based oil. The synthetics offer economic advantages in terms of fuel consumption and maintenance, but only if the engine is in good condition. The results of an Army study on aftermarket oil additives revealed that many of these additives offered very marginal improvement in dispersancy and detergency at a cost of potential performance problems as a result of high foaming tendencies and increases in low-temperature fluidity properties.

Publ: Driver v13 n3 p22-6 (Aug 1979)
1979 ; 2refs
At head of title: The Backyard Mechanic. Back to Basics.
Availability: See publication

HS-026 913

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT

Modifications to the TSC MOD-04 highway traffic noise prediction program to extend the scope of problem formulation are described. The FHWA (Federal Hwy. Administration) Level 2 Highway Traffic Noise Prediction Model features: revised vehicle reference noise emission levels, specification of site-specific (excess) attenuation, English/metric and metric/English conversion of engineering units for both input and output data, common input data format with TSC MOD-04 model, and user options to improve operating efficiency. Problem formulation, input data requirements, output error messages, examples of usage, and computer program documentation are presented. FHWA has given the Level 2 program the acronym STAMINA 1.0 for Standard Method in Noise Analysis (Version) 1.0. Appended are the basic formulation of the computerized prediction model, declared size of arrays, allocation of common block data, architecture of prediction code, and subprogram descriptions.

by F. F. Rudder, Jr.; D. F. Lam; P. Chueng
Science Applications, Inc., Energy and Environmental Sciences Div., 1651 Old Meadow Rd., McLean, Va. 22102
DOT-FH-11-9384
Rept. No. FHWA-RD-78-138; 5-451-00-066-06 ; 1979 ; 240p 4refs
Rept. for Dec 1977-Jun 1979.
Availability: NTIS

HS-026 914

SAFETY AT NARROW BRIDGE SITES

A study was undertaken to define the narrow bridge problem, to appraise the effectiveness of corrective measures, and to develop guidelines for corrective treatment at various bridge sites. A nationwide survey indicated that there may be 60,000 highway bridges in the U.S. that are deficient in width. Field studies were conducted at 25 selected bridge sites in seven states. Driver performance in terms of speed and lateral position was determined for each site, and modifications of signing and delineation were made at several sites. Before-and-after accident experience was available for one section of road where corrective treatments had been applied to several narrow bridges. A bridge safety index (BSI) was developed as the combination of ten individual bridge site rating factors: clear bridge width, bridge lane width/approach lane width, guardrail and bridge rail structure, approach sight distance/85% approach speed, 100 plus tangent distance to curve/curvature, grade continuity, shoulder reduction, volume-capacity, traffic mix, and distractions and roadside activities. For most bridges, the BSI can reasonably estimate the relative degree of hazard of a site in comparison with other sites. The BSI should be used on a trial basis to develop information for verification and modification of the technique. When employed by highway agencies, the collection and analysis of additional information should result in a revised concept of greater precision and effectiveness. Appended are driver behavior studies (with photographs), results of narrow bridge survey, and an annotated bibliography.

by D. L. Ivey; R. M. Olson; N. E. Walton; G. D. Weaver; L. Whitehurst Furr
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
Rept. No. NCHRP-203 ; 1979 ; 72p 68refs
Sponsored by American Assoc. of State Hwy. and Transportation Officials and Federal Hwy. Administration.
Availability: TRB $6.00

HS-026 915

ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY

Production of a national fleet of passenger cars with fuel efficiency averaging between 40 and 50 mpg by the year 2000 is a technically feasible and realistic goal, Secretary of Transportation Brock Adams stated before the Senate Com. on Commerce, Science, and Transportation. Adams released a preliminary report on a Mar 1979 conference he convened in Boston on the car of the future. The report, prepared by Raymond L. Bisplinghoff, of the National Res. Council, identified promising areas which offer great potential but where basic research is lacking: the diesel engine (information needed on emission control), reinforced plastics (data needed on design, mass production, and disposal characteristics), and engines fueled by nonpetroleum sources (information needed on emission characteristics). Secretary Adams called for a basic research program to be jointly conducted by the auto industry, private research laboratories, universities, and others, rather than by the Federal government. The logistics and funding of such a national program is to be discussed at a May 1979 major meeting of automotive experts. The need for the program is based on three factors: continued domination of the car as a transportation mode, adverse effect of continued dependence on foreign oil, and lack of initiative by manufacturers. Adams also said that serious consideration must also be given to the development of alternative fuels.

Publ: Collision v3 n2 p5-7 (Apr 1979)
1979 ; 1ref
Availability: See publication

HS-026 916

SCHOOL BUS DRIVER HIRING TECHNIQUES

Criteria for screening, testing, and hiring school bus drivers have been developed by William R. Kyser, supervisor of training and loss control of the Houston Independent School District transportation department. Kyser's employment model is structured around a set of "predictors," which provide an insight into the future driving behavior of the applicant. Predictors are grouped in tiers, of which the first (most important) tier includes driving record, criminal record, age, and amount and type of driving experience, and should determine whether the hiring process should continue. The second tier includes a behind-the-wheel test, medical exam and history, and questions on use of intoxicants and cigarettes, marital status, and motorcycle ownership. The final predictor is the applicant's performance and attitude during classroom and behind-the-wheel training. The predictors, if properly linked, may prove a system for behind-the-wheel behavior prediction, and should provide an organization with positive information concerning the probability of the applicant's future success as a safe driver. The system offers through the stages of pre-selection, selection, and training, an enhancement of the decision-making process involved in hiring a professional driver.

Publ: School Bus Fleet v24 n4 p12-3, 16 (Aug-Sep 1979)
1979 ; 1ref
Availability: See publication

HS-026 917

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)

The Center for Driver Education and Safety at St. Cloud State Univ., in cooperation with the Minnesota Dept. of Education, has developed a series of school bus driver training workshops which exceed the minimum recommended by Highway Safety Standard 17. These workshops, which total 56 hours of instructions, are provided to school districts and contract operators free of charge (through a grant of 406 funds from the Minnesota Dept. of Public Safety). Drivers are encouraged to participate initially in a basic workshop, a three-hour session designed to familiarize drivers with the task of school bus driving. Advanced workshops are conducted for those who want more in-depth analysis of the topics included in the basic workshop (driving skills, vehicle maintenance, human relations, accident and emergency procedures, and laws, rules, and regulations). Each topic is discussed within a three-hour time frame (total of 15 hours). In order to address the needs of drivers who transport special students, a three-hour workshop has been developed based on the National Hwy. Traffic Safety Administration's School Bus Driver Instructional Program. Another three-hour workshop addressed liability and insurance when transporting students. The American Red Cross' Multi-Media First Aid Course is offered to school bus drivers including nine hours of theoretical and practical experience. The National Safety Council's Defensive Driving Course with School Bus Supplement, a nine-hour program, and a six-hour instruction program in emergency driving techniques are offered. The Center for Driver Education and Safety hosts the annual State School Bus Driver Roadeo, and conducts local and regional roadeos by request.

by Rodney G. Dobey
Publ: School Bus Fleet v24 n4 p17-8 (Aug-Sep 1979)
1979 ; 5refs
Availability: See publication

HS-026 918

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION

In 1974, the Florida Dept. of Education began its program to train school bus driver instructors, the goal being to have a qualified instructor in every district in the state. All school superintendents and transportation directors were invited to participate in the program and criteria were explained for persons who would attend instructor workshops. Three-day workshops were conducted to provide potential instructors with a detailed explanation of the National Hwy. Traffic Safety Administration School Bus Driver Curriculum Package. The emphasis was placed on the development of teaching skills rather than on school bus driving skills, since most of the participants were already certified school bus drivers. The curriculum package given to each trainee consisted of five documents: a course guide designed to aid the training administrator and instructors in preparing for the course, instructors' guides for both basic and advanced units, and two trainee study guides designed to serve as student texts/workbooks. In 1976, an advanced course, including behind-the-wheel training, was offered to round out the instructor training. The positive results of Florida's training program have been seen not only in driver attitudes but also in accident statistics. For example, during the 1974-1975 school year, school buses averaged 96,158 mi. per accident, compared to 142,540 mi. per accident in the 1977-1978 school year.

Publ: School Bus Fleet v24 n4 p20-1 (Aug-Sep 1979)
1979 ; 5refs
Availability: See publication

HS-026 919

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)

The DeKalb School System (Atlanta area), has seven driver education ranges, first used for school bus driver training in Aug 1978. The school systems driver training course consists of four phases: classroom, simulation, on-street, and range. The primary purpose of the classroom phase, which uses audiovisual aids, is to provide learning activities enabling the drivers to demonstrate the visual-perceptual skills necessary for driving through the use of the SIPDE (search, identify, predict, decide, execute) process, and to demonstrate the commentary driving technique. The participants demonstrate a practical application of the SIPDE process in the simulation phase. Half of the drivers then participate in the on-street exercise, while the remainder are involved in range driving. In the on-street portion, each instructor takes two drivers through an 11-minute lesson to perfect driving technique, followed by 11 minutes of performance testing (observing; communicating; adjusting speed; positioning; judging time, space, and distance; and hazard perception). During the range phase, two drivers are assigned to a 16-, 27-, and 66-passenger bus in which they alternately perform basic and advanced maneuvers (instruction and practical application for three 55-minute and two 55-minute periods, respectively).

Publ: School Bus Fleet v24 n4 p24-5 (Aug-Sep 1979)
1979
Availability: See publication

HS-026 920

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES

The Weber County School District in Ogden, Utah, has developed a safety training program which addresses school children, PTA and other civic groups, and includes school bus driver training. It centers around a unique, self-contained, fully-automated, mobile training bus. The bus has central heating and air conditioning, carpeting, indirect lighting, piped-in music, and wood paneling. It contains a complete movie theater, with 8, 16, and 35 mm slide projection and full sound reproduction capabilities. The bus is equipped with power generator as backup to external systems. The mobile training center, which will hold approximately 30 pupils, is designed for 40-minute sessions of personalized instruction concerning the problems of traffic, pedestrian, bicycle, and school bus safety and includes presentations designed to educate new bus drivers. The atmosphere created by the Safety Training Bus generates attentiveness and interest.

Publ: School Bus Fleet v24 n4 p28-30 (Aug-Sep 1979)
1979
Availability: See publication

HS-026 921

NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS

Arapahoe School District 6 in Littleton, Colorado, has an extensive school bus driver training program in which all drivers are required to attend 40 hours of formal training. Acquisition of an International S-line bus with International DT-446 engine will require that drivers have a new training session on the use of the new equipment. Plans are being made for International Harvester instructors to advise drivers on the use of the new buses. Of two driver training programs in the district, the primary one is concerned with driving in metropolitan traffic areas, the other involves field-trip driving. Two handbooks are issued to all drivers: a standard school bus driver handbook, and an advanced driver training pamphlet which is updated periodically. Much of the advanced book deals with recognizing an automotive problem while out on the road, determining what is wrong, and deciding whether there is an immediate solution. Defensive driving is emphasized in the Arapahoe driver's manual. Special courses are given by the school district to preschoolers and their families concerning entering, leaving, and riding in school buses.

Publ: School Bus Fleet v24 n4 p32, 34, 36 (Aug-Sep 1979)
1979 ; 2refs
Availability: See publication

HS-026 922

EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY

Driver records and other data of subpopulations of drivers who completed three components of the Wisconsin Driver Improvement Program were examined to determine program impact on crashes, traffic violations, and drinking/driving incidents, and to make comparisons between program models and approaches in order to determine the most effective measures within the subprogram structure. The three components were Driver Interview (DI), Group Dynamics Traffic Safety School (GD-TSS), and the Demerit Point Reduction School (PRS). It was found that the differences between treatment and control groups of the DI were slim in most cases and not always favorable to the treatment group. The GD-TSS and the PRS showed better records than the DI activity. In order to reach conclusive results on the effect of GD-TSS and PRS on driving behavior, a controlled study is needed. No support was found for the theory that the time elapsed between violations increases with the number of accumulated points. It was suggested that the drinking problem (as expressed in the number of driving while intoxicated convictions) tends to run a "maturation" course. In some cases the record in post-school attendance at GD-TSS alcohol education-treatment/rehabilitation was poorer than in the preschool attendance.

by Camil Fuchs; Helen Pong
University of Wisconsin-Madison, Statistical Lab., 1210 West Dayton St., Madison, Wis. 53706
DOT-HS-6-01489
Rept. No. SL-79/1 ; 1979 ; 13p 9refs
Prepared for Wisconsin Dept. of Transportation, Div. of Motor Vehicles.
Availability: Corporate author

HS-026 923

TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT

The literature is reviewed concerning human factors and traffic accident causation, the relationship of specific characteristics (experience, demography, personality) of driver groups to driver behavior, driving behavior and cultural values and individual attitudes, accidents as social events, and social psychology and driving behavior. An approach is described which may permit better understanding of the psychological basis of behavior in the traffic environment. The basic theoretical position implicit in the method is that people's actual behavior is consistent with underlying attitude systems, regardless of expressed values and opinions. The method involves a fundamental analysis of public opinions aimed at eliciting information about basic feelings and attitudes. The first of a set of steps is to conduct interviews with experts to get some idea of the "official" opinions. Members of the public are then interviewed in a group setting, using a variety of techniques derived from such sources as psychoanalytic theory, T-Group procedures, and objective psychology. On the basis of these interviews, schedules are constructed and administered in a series of semi-structured interviews with a small, random sample of the public. A questionnaire is then constructed from the assembled data, and administered to a large, random sample of the population. Results are outlined from a study which applied this methodology; the three broad areas of interest were sources of hazard on the road, reactions to a near accident or collision, and the image o the dangerous or bad driver. It was found that drivers se certain properties and actions of other drivers as major element in the traffic environment, and as major sources of hazard. Driving was shown to be a social situation in which interpersonal reactions are of great importance, the reactions appearing to follow established principles in social psychology.

by C. K. Knapper; A. J. Cropley
Publ: "Environmental Assessment of Socioeconomic Systems,"
1978 p263-78
1978 ; 43refs
Sponsored by Transport Canada.
Availability: Plenum Publishing Corp.

HS-026 924

SENSIBLE SENSOR

The development of a sensor that knows when an automobile crash is serious enough to deploy air bags is discussed. Automotive air bags have evolved from research in the field of aviation safety. The crash sensor, developed by the Essex Group of United Technologies, will be used by Ford in its 1981 model year production. As the heart of air bag systems, the sensor determines whether an impact is severe enough to deploy the air bag. Most sensor types feature a spring mass design. Each sensor has a weight held in place by a tensioned leaf spring or magnet. In a crash of sufficient G forces, weight overcomes the force of the spring or magnet and closes an electrical contact. The air bag is then deployed with a gas propellant. In some cases, sensors operate within a time interval of less than 10/1,000th of a second. Air bags inflate and begin deflating within 1/25th of a second. The Essex gas-dampened sensor has the advantage of being a true velocity integrator, i.e., the sensor measures velocity change as well as G forces experienced in a crash and combines these measurements to determine whether air bags should be deployed. Statistics indicate that approximately 12,000 automobiles, factory-equipped with airbags, traveled an estimated 902 million passenger miles from 1972 to 1978. The accident fatality rate for cars not equipped with air bags was estimated to be over 2 1/2 times higher than for air bag equipped cars.

by Martin W. Kraegel, Jr.
Publ: Status Report v14 n13 p14-7 (21 Aug 1979)
1979
Reprinted from Beehive, United Technologies quarterly magazine, Spring 1979.
Availability: See publication; In HS-026 925

HS-026 925

AIR BAGS: A SPECIAL ISSUE

Information about air bags and the status of the Dept. of Transportation's (DOT) automatic restraint standards is provided in a special issue by the Insurance Inst. for Hwy. Safety. Automatic crash protection requirements of DOT specify minimum levels of automatic protection for front-seat occupants in frontal and front-angle crashes at speeds up to 30 mph. Cancellation or delay of these requirements may force air bag manufacturers to terminate their efforts. Manufacturers have invested nearly $20 million to design, develop, and test air bag system components. DOT estimates that about 9,000 crash deaths and 65,000 serious injuries would have been prevented if all cars on the road in 1975 were equipped with automatic restraints. In mass production, air bags will increase car prices by $200-$250. Although some Congressmen (e.g. Rep. John Dingell) do not favor the use of air bags, increased levels of crash protection have been affirmed by the courts and Congress and public opinion polls consistently show a strong preference for the safety and convenience of automatic crash protection. Personal experiences of people who survived automobile crashes because of air bags are presented, as well as information on the myths and realities of air bags.

Publ: Status Report v14 n13 p1-20 (21 Aug 1979)
1979
Includes HS-026 924.
Availability: See publication

HS-026 926

WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)

The development of a wheelchair tie-down system for use in rail passenger cars is outlined. As part of the Canadian government's 1976 improvement program for rail passenger cars, a contract was awarded to design and fabricate prototype wheelchair tie-down passenger seats for persons with physical disabilities. Objectives of the contract were to immobilize wheelchairs of different dimensions and structures with passengers aboard during travel on a high-speed train, to provide appropriate seating for passengers who want to switch from wheelchairs to seats during a long trip (3-6 hours), and to provide for elderly and semiambulatory persons who are not wheelchair-bound. Available seating space for each handicapped passenger is 41 inches wide and 57 inches long along the train axis, one side facing the bulkhead and the other side facing seats. The wheelchair tie-down concept consists of an independent unit connected to a strong bulkhead, or used free-standing, with the addition of braces. A steel structure covered by a fiberglass shell is bolted to the floor tracks and the bulkhead. If free-standing, the unit is through-bolted to floor tracks supported by braces. Two arms swing out at 45-degree angles and are anchored to the structure where it meets the floor. To accommodate different wheelchair widths and wheel diameters, arms pivot around their anchor points and have telescopic adjustments. Two-point hooks on the end of arms are placed over the wheels. A lever locks the wheelchair by pressing wheels against the shell and the floor. A support for the head and back is provided, and a belt at waist level gives extra support for wheelchair-bound persons with upper body control problems. Two prototype units have been built and have undergone G-loading tests. Drawings and specifications of prototypes, and photographs are included, and a test report prepared by TES Limited, Ottawa (TES-C225-1) is appended.

by Uwe Rutenberg
Douglas Ball Inc., 88, rue Sainte-Anne, Sainte-Anne-de-Bellevue, Que. H9X 1L8, Canada
095DT8200-7-7523; 0SS77-09037
Rept. No. TP-1821 ; 1978 ; 73p
Rept. for Nov 1977-Nov 1978. Sponsored by Transport Canada.
Summary in French.
Availability: Transport Canada, Res. and Devel. Centre, P.O. Box 549, Montreal, Que. H3A 2R3, Canada

HS-026 927

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS

Ten papers are compiled on the following aspects of transportation safety: work zone safety; liability for improper traffic signaling, signing, and pavement markings; status of traffic safety in highway construction zones; crash test evaluation of temporary traffic barriers; evaluation of timber barricades and precast concrete traffic barriers for use in highway construction areas; accident analyses of highway construction zones; computer model for liquefied natural gas and liquefied propane gas risk simulation; crash testing of nuclear fuel shipping containers; safe transport of munitions; and special problems encountered by highway agencies and contractors in designing work zone layouts as related to tort liability.

Transportation Res. Board, 2101 Constitution Ave., N.W.,
Washington, D.C. 20418
Rept. No. TRR-693 ; 1978 ; 57p refs
Includes HS-026 928--HS-026 937. Prepared for 57th annual meeting.
Availability: TRB $3.00

HS-026 928

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)

The Federal Hwy. Administration's (FHWA) 1976 program to improve safety in construction and maintenance zones pressed for improvements in the Manual on Uniform Traffic Control Devices (MUTCD) relating to traffic control at work sites, initiated a number of training programs on work site safety, allocated $2.5 million for research in innovative safety practices in work areas, and measured progress through an extensive national review of safety practices at work sites. Although safety at work sites has improved, there are still major problem areas. Accident data are still not used to identify safety problems at work sites. The use of barrier and guardrail to protect the work area has improved, but there are still too many blunt-end and transition hazards. Construction materials and equipment are often stored hazardously close to the roadway. In many cases, major dropoffs are not effectively shielded from motorists. Many of the present work zone safety problems relate to the lack of knowledge on how to improve traffic operations at work sites, which is reflected in the vagueness of MUTCD criteria. If considerably more progress is not made in improving work site safety, the FHWA will be forced to consider more stringent requirements for work site activities, including traffic control plans developed as a prerequisite for project approval. In addition, FHWA must provide additional guidance on driver needs in work sites, based on human factors research.

by H. L. Anderson
Federal Hwy. Administration, Washington, D.C. 20590
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p1-4
1978 ; 1ref
Availability: In HS-026 927

HS-026 929

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT

Although there has been a significant increase in tort litigation against highway departments, court decisions and recent tort claims acts recognize that states and state agencies should not be held liable for negligent performance of governmental functions that are discretionary in nature (i.e. involving the power to make choices among valid alternatives and to exercise independent judgment). The general view is that the state is not liable for negligence in the performance of functions which involve a high degree of discretion but is liable concerning ministerial or operational level tasks. Ministerial tasks are said not to require any evaluation or weighing of alternatives before performance of the assigned duty. Immunity usually attaches to governmental decisions about signs, signals, or markings if the government shows that the plan, design, or program has been adopted after reasonable consideration and deliberation. Some decisions are clearly more discretionary than others, and court decisions differ on that account. The trend appears to be that only decisions made at a policy level or those involving a consideration of policy factors are discretionary. The result has been to narrow the duties that are discretionary; more decisions that once would have been immune from liability no longer enjoy that protection. The majority of the courts hold that only decisions made at the planning level, rather than at the operational level, fall within the discretionary function exemption. It would appear that the decision on whether to provide signs, signals, or markings is the exercise of immune discretion at the planning level, but that negligence thereafter in provision or in maintenance of signs is less likely to be protected from liability.

by Larry W. Thomas
Transportation Res. Board, 2101 Constitution Ave., N.W.,
Washington, D.C. 20418
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p4-6
1978 ; refs
Availability: In HS-026 927

HS-026 930

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES

Evidence is increasing that existing traffic control practices do not always provide adequate safety in construction zones. Numerous accident studies have shown that the total accident experience in construction zones increased from 2% to 119% during construction periods, and that the accident increases were highly related to construction activity. A study in one state showed that accidents decreased dramatically when construction-zone traffic control practices were improved. All phases of traffic control in construction zones can be improved, including planning, designing, and management. More effective planning and design of construction-zone traffic control should require a step-by-step planning process including collection of roadway, traffic, and construction data; selection of basic zone type and scheduling; formulation of a speed control strategy; determination of geometric design elements; and selection of traffic control devices and methods. More effective management of construction-zone traffic control should include improved public information, training of field personnel, review and modification of traffic control, removal of inappropriate devices, and improved maintenance of traffic control devices.

by Robert J. Paulsen; Douglas W. Harwood; Jerry L. Graham; John C. Glennon
Howard Needles Tammen and Bergendoff, Kansas City, Mo.; Midwest Res. Inst., Kansas City, Mo.
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p6-12
1978 ; 18refs
Based on a review of literature and current practices conducted by Midwest Res. Inst. as part of a study sponsored by the Federal Hwy. Administration. See also HS-026 933.
Availability: In HS-026 927

HS-026 931

CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS

Three currently used temporary barrier devices were evaluated in crash testing in order to determine their performance limits: 250-mm. x 250-mm. (10-in. x 10-in.) timber barrier, W-beam barrel barrier, and type X curb. These traffic barriers were subjected to controlled impacts with full-sized 2040-kg (4500-lb) automobiles impacting at angles from 7 degrees to 16 degrees at speeds from 56 kph (35 mph) to 90 kph (56 mph). The timber barrier had minimal redirection capability. The upper rail members were not functional and exhibited a potential for spearing both vehicles and occupants. The lower base was readily mounted by vehicles at nominal speeds and angles. Use of this barrier for containment and redirection is not recommended. The base with upper railings removed could be used for very low speed operations, where speeds and impact angles are low and traffic consists of automobiles only. The W-beam-barrel design was an effective containment barrier for the vehicle impacting at 73 kph (45 mph) and an angle of 15 degrees. The type X curb was ineffective in redirecting vehicles; it was readily mounted, and even at angles of 8 degrees it did not appear to be capable of redirecting the vehicle at 56 kph (35 mph). The fact that the test vehicle did not completely go over the test barrier is attributed to the deceleration force imparted by the snagging of the splice plate (a non-repeatable means of deceleration), which caused severe damage to both vehicle and barrier. (The timber barrier has been banned by the Federal Hwy. Administration from further applications).

by Maurice E. Bronstad; C. E. Kimball
Southwest Res. Inst., San Antonio, Tex.
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p13-8
1978 ; 2refs
Sponsored by Federal Hwy. Administration.
Availability: In HS-026 927

HS-026 932

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS

Results are summarized of a study of the performance of the timber barricade, and a comparison of its characteristics and performance with those of the precast concrete traffic barrier. The study included a traffic accident analysis of the construction zone on I-495 in northern Virginia where the timber barricade was employed; a comparison of the technical, operational, and economic feasibility of the timber barricade and the precast concrete traffic barrier; and a review of the legal requirements for temporary barrier systems. The frequency of accident occurrence during construction on I-495 was approximately 119% higher than that before construction. Of the reported crashes during construction, 52.5% involved vehicle contact with the timber barricades. Of the vehicles involved in crashes with the barricades, 73.5% straddled or penetrated the barricades. Thus, for this site, the timber barricades were ineffective as positive barriers. From the technical, operational, and economic analyses, the precast concrete traffic barrier appeared to be superior. Since the completion of this study, the Federal Hwy. Administration has banned the use of the timber barricade as a positive barrier on any Federal or Federal-aid project.

by Frank N. Lisle
Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p18-25
1978 ; 11refs
Sponsored by Virginia Dept. of Highways and Transportation, and Hwy. Safety Div. of Virginia.
Availability: In HS-026 927

HS-026 933

ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES

Accident analyses were conducted for 79 construction projects in seven states. Time-trend analysis showed that construction zones caused an average increase of 1.60 accidents/mo. The total number of accidents increased by 7.5%, the accident rate by 6.8%. Of the projects studied, 31% had accident decreases during construction; 24% had rate increases of more than 50%. Three case studies of zones with rate increases of 40% or more indicated that construction-related accidents were responsible for the increases. Total accident number and rate analyses showed a slight shift toward property-damage-only accidents. Linear regression analyses indicated a strong correlation between traffic control devices and construction fixed-object accidents, and a poor correlation between construction-zone variables and ran-of-road accidents. Accident number analysis showed a substantial increase in fixed-object, head-on, and rear-end accidents, but a decrease in ran-off-road and sideswipe accidents. Various analyses implicated reduced traffic speed in accident increases. Six- or eight-lane Interstate projects reduced to one lane in each direction had accident rate increases of over 100%, but those reduced to two lanes in each direction had increases of only 5%. Four-lane, divided Interstate projects reduced to two-lane, two-way had percentage increases more than double those in which the roadway was reduced to one lane in each direction. Five-lane, undivided highways with two-way left-turn lanes reduced to two lanes had the highest rate increase of all road types. Two-lane roads reduced to one-way alternating operations had worse rates than those placed on new alignment. Bridge work, followed by road reconstruction (on the same alignment), had the largest percentage of accident rate increases.

by Jerry L. Graham; Robert J. Paulsen; John C. Glennon
Midwest Res. Inst., Kansas City, Mo.; Howard Needles Tammen and Bergendoff, Kansas City, Mo.
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p25-32
1978 ; 2refs
Based on study sponsored by the Federal Hwy. Administration.
See also HS-026 930.
Availability: In HS-026 927

HS-026 934

COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION

Early in 1971, the National Transportation Safety Board recommended a general framework for risk analysis of hazardous materials. The HAZ-EX computer program was developed to provide analysis of the risk to the public associated with the transportation of hazardous materials. The program is intended to give project designers safety information on routes and sites during the planning stages of a project. The HAZ-EX program is a modular design whereby each module is an element of the risk analysis. The elements range from the simulation of spill dynamics to human injury criteria. The advantage of a modular approach is that updated data or alternative phenomenon descriptions can be inserted. The program capability includes material storage and ship, pipeline, truck, and rail transportation modes. Program-effects analysis capability includes prediction of injury due to toxicity, radioactivity, flammability, and explosivity. By selecting the appropriate combinations of modules, rapid comparisons can be made of site, transportation mode, transportation routes, and system alternatives. The HAZ-EX program has been applied to the storage and bulk transportation of liquefied natural gas and liquefied propane gas. The use of realistic injury and damage criteria as well as accurate physical phenomena description are extremely important. The advantage of a computerized model is speed. A few pages of computer output can apprise decision makers of the safety aspects of a proposed movement of hazardous materials. If a working definition of acceptable risks were then available, the reviewer could be easily satisfied as to the acceptability of an applicant's plans as proposed or whether modifications would be necessary. The efficacy of modifications can be evaluated by rerunning the model.

by F. B. Silvestro; M. J. Mazurowski
Ecology and Environment Inc., Buffalo, N.Y.
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p32-5
1978 ; 5refs
Availability: In HS-026 927

HS-026 935

CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS

A program begun in 1975 investigated the dynamics of extra severe transportation accidents and evaluated state-of-the-art computational techniques for predicting the dynamic response of shipping casks involved in vehicular system crashes. One phase of this research used computational methods to predict the effects of the accident environment and subsequently to calculate the damage incurred by a container as the result of such an accident. A second phase involved the testing of one-eighth-scale models of transportation systems. Through the use of instrumentation and high-speed motion photography, the accident environments and physical damage mechanisms were studied in detail. After correlating the results of the first two phases, a full-scale event, involving representative hardware, was planned. The selected accident scenarios included crashes of a tractor-trailer rig carrying a spent nuclear fuel cask into a massive concrete barrier at 100 kph and 130 kph; high speed (130 kph) impact of a locomotive into a truck-mounted, spent nuclear fuel cask at a simulated grade crossing; and impact at 130 kph of a special rail car carrying a spent nuclear fuel cask, followed by exposure to a fire. To date, the first two test scenarios have been completed. Results of the program so far indicate that both computational techniques and scale modeling are viable engineering approaches for the study of accident environments and physical damage to shipping casks.

by Robert M. Jefferson; H. Richard Yoshimura
Sandia Labs., Albuquerque, N. Mex.
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p35-44
1978 ; 13refs
Sponsored by Energy Res. and Devel. Administration (now Dept. of Energy).
Availability: In HS-026 927

HS-026 936

SAFE TRANSPORT OF MUNITIONS

The Dept. of Defense (DOD) is conducting a study to determine procedures and methods that are technically and operationally feasible and economically acceptable to prevent, or limit, the effects of explosive incidents in rail cars, and mass detonation of containerized munitions in port areas and aboard ships. The study was initiated after incidents at Roseville, Calif. (28 Apr 1973) and Benson, Ariz. (24 May 1973) involving explosions on trains loaded with high-explosive bombs. Selected DOD components, whose inherent mission, expertise, and physical assets are appropriate to developing solutions, will conduct technical and operational feasibility studies. Each participant (i.e. the Army Ballistic Res. Lab., the Army Ammunition Center, the Navy Weapons Center, and the Military Traffic Management Command) will coordinate its area of study with other governmental and industrial organizations. The 13 tasks of the STROM (safe transport of munitions) study have been categorized into six major areas: background information, traffic patterns, equipment, fire protection, buffering, and sea containers. The STROM study, including a final report, is to be completed within 33 months, ending in Sep 1980. The total cost is estimated to be almost $3 million, which will be funded by both the Army and the Navy.

by Burton M. Rudy; Anthony M. Ragunas; Terrence K. H. Wong
Transportation Engineering Agency, Military Traffic Management Command
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p44-6
1978
Availability: In HS-026 927

HS-026 937

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS

The principles of tort liability apply generally, whether the case is one of highway design, maintenance, or construction. Construction zones present special problems in that they are at variance with the motorist's normal expectations. Adequate warning devices and barrier safeguards are therefore required. Most tort liability cases discuss what is not adequate; what is adequate remains a vague item in terms of legal discussion. In light of this, the following topics are discussed: court guidelines which indicate general responsibilities in the case of accidents resulting from alleged highway defects, Federal highway safety programs and requirements, and recent cases that provide first-hand knowledge of judicial treatment of the subject matter.

by David C. Oliver
Federal Hwy. Administration, Washington, D.C. 20590
Publ: HS-026 927 (TRR-693), "Safety in Construction and Maintenance Work Zones and Transportation of Hazardous Materials," Washington, D.C., 1978 p47-51
1978 ; refs
Availability: In HS-026 927

HS-026 938

COLD TEMPERATURE TESTS OF HEATED/ INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS

Field tests were conducted to evaluate ways of maintaining electric vehicle batteries in an operable condition, i.e., electrolyte temperature above 50 degrees F over weekend "cold-soak" periods in ambient temperatures as low as 15 degrees F. The Postal Service operates about 400 electric vehicles, predominantly American Motors General DJ-5E Jeeps with a 1300-lb, 3.22-cubic foot, 54-volt Gould propulsion battery. Numerous vehicles were assigned to delivery routes in low ambient temperatures which affected battery performance. Field installation of foil-faced insulation on inservice batteries maintained a higher electrolyte temperature than unwrapped batteries exposed to 15-degree F ambient temperatures. While overnight "cold-soak" in 15-degree F ambient temperatures did not significantly reduce battery capacity because of the heat retained after completion of the charging cycle, weekend "cold-soak" at this temperature reduced battery capacity so that vehicles could not complete assigned routes. Test results indicated that a heat source of about 300 watts with a foil-faced insulation cover and heat cycling by thermostatic control would maintain batteries in an operable condition.

by Lewis J. Gerlach
Postal Service, Res. and Devel. Labs.
Rept. No. SAE-790115 ; 1979 ; 7p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 939

RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION

Risk analysis techniques were applied to the automotive industry to assess equipment and/or product damage caused by system failures. The client was interested in determining what System elements were responsible for damage and whether the system could be repaired at reasonable cost and with a high probability of success. In addition to fulfilling stated objectives, risk analysis identified a high probability of assembly line downtime due to electronic control failures. Analysis included microcomputers, electromechanical interface between computers and machines, operator-computer interface and the operator, and computer-encoder-conveyor interface. Findings demonstrated that damage failures were due to loss of synchronization between the assembly line and the control system, erroneous job data, and failed safety circuits. Reliability improvements were recommended in the areas of safety circuits, system elements requiring safety circuit intervention, and control system hardware. Among the recommendations were safety circuits improved to assure high probability (by monitoring or by redesign), redesigned conveyor position, redundant checks for operator job entry data, and preventive maintenance on machine and conveyor braking systems. It is noted that risk analysis is most cost/effective when performed in the design phase.

by David A. Hulburt; Larry R. Albaugh
Hercules Inc., Allegany Ballistics Lab., Cumberland, Md.
Rept. No. SAE-790283 ; 1979 ; 10p 3refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 940

GM'S NEW X-CARS

Testing of General Motors' 1980 compact cars ("X-cars"), designed to offer good fuel mileage, is reported. Front-wheel drive in compacts eliminates a large driveshaft hump, leaving more interior room, and an engine mounted from side to side rather than fore and aft shortens the hood. Aerodynamic body styling and a radial ply tire with lower rolling resistance than that of conventional radials improve fuel economy. Four 1980 models (Buick Skylark, Chevrolet Citation, Oldsmobile Omega, and Pontiac Phoenix) share most major components, such as engine, transmission, wheels, tires, brakes, steering, and basic body. They differ primarily in front and rear body styling and in the instrument panel design. Test results on these cars pertain to engine and drive train, front and rear accommodations, interior noise level, ride, normal handling, accident avoidance ability, brakes, safety features, bumper protection, controls and displays, climate control, and periodic servicing. General Motors is evaluated as very successful in the design of 1980 compact cars. Price data are tabulated.

Publ: Consumer Reports v44 n9 p540-5 (Sep 1979)
1979
Availability: See publication

HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT

Equations of planar motion are presented for vehicle occupants in a crash environment, in a study focused on automotive safety, crash and occupant dynamics, restraint systems, and whole-body responses. Features of the analytical model include: eight-mass 14-degree-of-freedom representation of the human body; extensible multijoint neck and flexible shoulder joint; simulation of biodynamic muscle contraction as a time-dependent phenomenon; modeling of contact between victim and vehicle by means of contact-sensing ellipses attached to the body and a real-line representation of the vehicle interior and exterior; specification of material properties for vehicle and occupant in terms of general force-deformation relationships; structural collapse resulting from collision or occupant contact forces; an air bag model that predicts forces on the occupant by solving gas thermodynamic equations; 4-degree-of-freedom energy-absorbing steering assembly; simple energy-absorbing belt restraint submodel with three independent straps and advanced belt restraint submodel with up to seven straps, two slip points, and vehicle-sensitive or webbing-sensitive inertia reels; and tabular 3-degree-of-freedom vehicle accelerations.

by Bruce M. Bowman; Robert O. Bennett; D. Hurley Robbins
University of Mich., Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-5-1 ; 1979 ; 236p
Sponsored by Motor Vehicle Manufacturers Assoc. Vol. 2 is HS-026 942; Vol. 3 is HS-026 943. See also HS-026 944.
Availability: Corporate author

HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT

In a study focused on automotive safety design, crash and occupant dynamics, restraint systems, and whole-body responses, a user's guide is provided to the Motor Vehicle Manufacturers Assoc. two-dimensional crash victim simulator. Specifications for input data cards are provided, along with a detailed description of input data quantities. Normal output options and certain normal output quantities are examined. Inputs ano outputs are given for two sample exercises of the computer model.

by Bruce M. Bowman; Robert O. Bennett; D. Hurley Robbins
University of Mich., Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-5-2 ; 1979 ; 295p
Sponsored by Motor Vehicle Manufacturers Assoc. Vol. 1 is HS-026 941; Vol. 3 is HS-026 943. See also HS-026 944.
Availability: Corporate author

HS-026 943

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT

To assist professional computer programmers responsible for program maintenance and improvement in the Motor Vehicle Manufacturers Association two-dimensional crash victim simulator, the organization of the computer program according to five processors and their interactions is detailed. Program organization and flow, packing techniques, binary output formats, and auxiliary program outputs are discussed for each processor. Design information about special output subprocessors is presented, and conversion of the computer program for use on various computer systems is examined.

by Bruce M. Bowman; Robert O. Bennett; D. Hurley Robbins; Judith M. Becker
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-5-3 ; 1979 ; 340p
Sponsored by Motor Vehicle Manufacturers Assoc. Vol. 1 is HS-026 941; Vol. 2 is HS-026 942. See also HS-026 944.
Availability: Corporate author

HS-026 944

VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT

Features and use are described of the Validation Command Language (VCL) computer program developed to aid automotive safety researchers in quantifying comparisons between impact test results and predictions of mathematical simulations. The VCL has been structured to provide user ease, self-contained analytical power, and graphical output capability. It is divided into five major divisions (identification, assessment, preparation, comparison, and presentation). Anticipated applications of the VCL software are: manipulation, analysis, comparison, and graphic presentation of dynamic impact data; simplification of procedures necessary for the quantitative validation of mathematical models; and establishment of possible correlations between experiments and theoretical estimates. Additional formula interpreter software carries manipulation and analysis capabilities further. If an analytically-based performance criterion is devised, the user can invest the formula as data and retrieve results with no additional postprocessing. Detailed program information and tables are provided.

by R. O. Bennett; J. M. Becker; D. H. Robbins
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-6 ; 1979 ; 111p
Rept. for 1 Jul 1978 - 29 Jun 1979. Sponsored by Motor Vehicle Manufacturers Assoc. See also HS-026 941--HS-026 943.
Availability: Corporate author

HS-026 945

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT

Results of laboratory tests performed on five commercial air brake antilock systems are discussed (Bendix, Eaton, B. F. Goodrich, Kelsey-Hayes, Wagner). Operational features of all systems covered a variety of characteristics: single/double solenoid air valves; pneumatic logic; and high frequency pulse-rate solenoid modulation. Antiskid hardware (air valve and logic module) was located in a laboratory area and connected by trunk lines to a hybrid computer. Single wheel dynamics were simulated on the analog computer and generated the required wheel speed signal to the antiskid logic module. Brake pressure was transduced from brake cans connected to the antiskid air valve and returned to the analog computer for the calculation of brake torque. The matrix of simulated test conditions, represented by parameters on the analog computer, included three repeats for each variation in wheel load, wheel inertia, tire-road friction, and initial velocity. Different hardware and control strategies used by the five antilock systems produced significant differences in wheel speed cycling behavior. A general feature shared by most systems was the recurrent philosophy of slow brake pressure application and quick release. This antiskid data base can be used to approximate and represent antiskid system performance in large-scale vehicle simulations. Additional information and tables on the analysis of antiskid systems are appended.

by C. C. MacAdam; P. S. Fancher
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-78-47 ; 1978 ; 94p 2refs
Rept. for 1 Jul 1977-15 Oct 1978. Sponsored by Motor Vehicle Manufacturers Assoc.
Availability: Corporate author

HS-026 946

USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS

A study was made of exposure to carbon monoxide (CO) by commuters between Washington, D.C., and Reston, Va. Measuring equipment included a constant flow sampler pump, a dosimeter, and a readout device. Seat placement of bus and automobile commuters varied but was more often in the rear, an area characterized as possibly having higher CO concentrations. Thirty-seven runs between the two cities were made, 18 in the morning and 19 in the afternoon. Of 40 testing hours, 25 hours were on parkways and suburban streets and 15 hours were in the city. The mean CO concentration in buses was 13.1 ppm;

that in automobiles was 13.8 ppm. Air-conditioned buses averaged 60% higher CO concentrations than nonair-conditioned buses. Ambient concentration levels averaged 3.5 ppm in the city. No relation between ambient levels and interior concentrations in vehicles was discerned. Findings indicate that commuter CO exposure is considerably higher than can be estimated from ambient readings.

by Lance Wallace
Environmental Protection Agency, Washington, D.C.
Rept. No. EPA-79-59.2 ; 1979 ; 13p 13refs
Prepared for the 72nd Annual Meeting of the Air Pollution Control Assoc., Cincinnati, 24-29 Jun 1979.
Availability: Corporate author

HS-026 947

ENGINE REPAIR: A MESSAGE FROM JOAN CLAYBROOK

The public's disenchantment with and distrust of the automobile repair industry is addressed. In the wake of escalating prices for gasoline, more complex engines and air pollution devices, higher priced cars, and extended and costlier car financing, consumers find themselves less able to cope with the expense of owning and operating a car. To achieve the best possible fuel efficiency, consumers may find it necessary to spend more money on maintenance. It is estimated that owning and operating vehicles costs Americans about $160 billion yearly, more than income spent on clothing and medical care. Approximately half of this amount is spent for gasoline and oil, repairs and maintenance, insurance, parking, and tolls. About $50 billion involves repair and maintenance work, with $20 billion lost to fraudulent practices by the automobile repair industry and poor automobile design. There is a threatening shortage of qualified mechanics. It is suggested that manufacturers meet their responsibility in training mechanics properly, that engineers and manufacturers pay more attention to designing cars which are easy to service, that independent garage owners have access to service bulletins of manufacturers, that cars be designed to require fewer special tools for repair, and that consideration be given to government regulation or licensing of mechanics.

by Joan Claybrook
Publ: Motor Service p35 (Aug 1979)
1979
At head of title: Engine Repair.
Availability: See publication

HS-026 948

CARS THAT DON'T PROTECT YOU IN A CRASH

The design of safety features and technology by automobile manufacturers in the United States is explored, the primary issue being the number of Americans who are injured or killed in crashes. Reasonable estimates indicate that every 1,000 vehicles will be involved in 2,000-3,000 crashes that will kill more than three people and injure more than 300. Some major automotive companies are changing their position on motor vehicle safety, and work is progressing on automatic (passive) crash protection systems. These systems will give superior protection in frontal crashes at speeds greatly in excess of the 30-mph crash testing speed required by a Federal standard that becomes effective in 1981. A major problem is how to encourage the public to purchase and use seat belts. Polls show that the public wants to improve automobile safety. Some judicial decisions have favored the delegation of crash-injury protection to manufacturers. Instead of safety, what is sold too often is erroneous information about life-saving technology. Motor vehicle manufacturers need to comment more constructively on government proposals to reduce crash-injuries, to propose Federal motor vehicle safety standards, to show leadership in developing vehicles for safety research, and to exceed Federal minimum motor vehicle safety standards.

by William Haddon, Jr.
Publ: Business and Society Review v28 p28-35 (Winter 1978-1979)
1978
Availability: See publication

HS-026 950

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS

A historical review of the Federal Motor Vehicle Safety Standard (FMVSS) 121, Air Brake Systems, is presented. The standard, issued by the National Highway Traffic Safety Administration (NHTSA) in 1971, specifies air brake system performance requirements for trucks, buses, and trailers. Much of the controversy surrounding the standard involves the use of antilock devices (computerized modules) which were designed to detect wheel skidding during the braking process and to modulate brake pressure to prevent skidding. The historical review is intended to provide a factual account of rulemaking activities associated with FMVSS 121 and to aid in a subsequent safety effectiveness evaluation of the NHTSA rulemaking process.

National Transportation Safety Board, Office of Evaluations and Safety Objectives, Washington, D.C. 20594
Rept. No. NTSB-SEE-79-4 ; 1979 ; 57p 12refs
Vol. 2 is HS-027 910; Vol. 3 is HS-028 716; Vol. 4 is HS-028 979.
Availability: NTIS

HS-026 951

AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS

Traffic safety effects of probation by mail were compared to those of individual hearings for 13,899 California drivers whose conviction records placed them at or near the negligent operator level. Of all drivers, 44% or 6,148 fell into the group with high accident risk; these individuals were eliminated from the population of drivers eligible for probation by mail. Remaining subjects were assigned to the probation by mail group (3,883 persons) or to the individual hearing group (3,868 persons) according to the terminal digit of their driver's license number. There were no significant differences in subsequent accident records of the two groups. Drivers in the probation by mail group had significantly more convictions, with a resultant increase in probation violator hearings. Drivers screened as high risk who received the standard hearing did not differ significantly in subsequent accidents or convictions from nonhigh-risk drivers who received a hearing. No evidence was found to indicate that minimizing the number of in-person contacts between negligent operators and driver improvement analysts adversely affected traffic safety. In a closely related study of no-action hearings, there was no evidence that the hearing without probation had a detrimental effect on traffic safety. Because there are no clear-cut accident effect differences between probation by mail and no-action hearings and since probation by mail results in greater budgetary savings, its implementation is recommended.

by Beverly Sherman; Michael Ratz
California State Business and Transportation Agency, Dept. of Motor Vehicles, Sacramento, Calif.
Rept. No. CAL-DMV-RSS-79-70 ; 1979 ; 36p 13refs
Availability: Corporate author

HS-026 952

RISK ANALYSIS IN MAINTAINABLE DESIGNS

The impact of availability and maintainability on management decisions is evaluated within the context of risk analysis. There has been increased utilization of risk analysis to assess reliability and safety considerations in design and management decision processes. A primary business objective is to gain customer acceptance by satisfying product availability criteria. This can be attained by providing highly reliable and/or easily maintainable products. In the design philosophy where a highly maintainable design is the best alternative, risk analysis becomes an important tool in assessing the risk of down time and the risk associated with maintenance actions. Consumerism trends indicate that many individuals maintain their own vehicles. Due to government emission and energy regulations, new design features are being introduced. The goal of developing automobile systems that can be easily maintained without jeopardizing the safety of maintenance personnel can be achieved by establishing mean-time-to-repair criteria and conducting risk analysis studies to assure that maintenance actions pose minimum risk. An illustrative example of risk analysis in headlamp replacement is presented.

by H. J. Bajaria; Gregory Gruska
Lawrence Inst. of Tech., Southfield, Mich.; General Motors Corp., Warren, Mich.
Rept. No. SAE-790284 ; 1979 ; 8p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE-790284

HS-026 953

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT

As a supplement to 34 passenger and pedestrian symbols designed in the original study for use in transportation-related facilities 16 more have been developed. The project was intended to produce a consistent and interrelated group of symbols that will bridge the language barrier and simplify basic messages at domestic and international travel facilities. The symbol development process has attempted to take full advantage of widely recognized existing symbol concepts and to introduce new symbols only where no satisfactory concepts are available. A detailed description of procedures used to create symbols and suggestions for symbol use are presented under headings of inventory, analysis/evaluation, recommended symbols, and guidelines.

American Inst. of Graphic Arts, 1059 Third Ave., New York, N.Y. 10021
DOT-OS-60510
Rept. No. DOT-RSPA-DPB-40-79-2 ; 1979 ; 112p 22refs
Rept. for Jun 1976-Mar 1979.
Availability: NTIS

HS-026 954

CARGO SECURITY LITERATURE SURVEY

An annotated literature review focuses on cargo theft and pilferage losses in transportation. A major goal of DOT is that goods in U.S. commerce flow arrive at the destination intact, on time, at minimum shipper costs, and with a reasonable carrier profit. By the establishment of an effective cargo security system, transportation management can eliminate, or at least decrease, theft and pilferage losses, can increase profits, can provide more reliable and efficient service, and can make goods available at lower costs. Cargo security is the joint responsibility of shippers, carriers, and receivers. The magnitude of the overall cargo security problem is surveyed in concept. Problems and countermeasures associated with four transportation modes (motor, air, railroad, and water) are covered. Transportation cargo security conferences held to address these problems are noted and a source index to the literature is included.

Department of Transportation, Office of Transportation Security, Washington, D.C. 20591
1979 ; 141p refs
Availability: Corporate author

HS-026 955

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES

Comments are offered by the Comptroller General on the Dept. of Transportation's (DOT) requirement for passive restraint systems for front-seat occupants in all new cars manufactured after Sep 1, 1983. The two systems under consideration are air bags and automatic seat belts. DOT estimates that passive restraints will prevent about 9,000 traffic deaths and 65,000 serious injuries annually and indicates that the use of sodium azide as the generator of gas for air bags will pose no unmanageable major health, safety, and environmental problems. The department also states that passive restraints can be installed at a reasonable cost and that the cost of such systems will be more than offset by insurance savings. Because of the potential danger for out-of-position occupants, the Comptroller General recommends that additional testing of passive restraints be conducted by the National Hwy. Traffic Safety Administration. It is further suggested that actual experience with passive restraints be evaluated and that the Environmental Protection Agency (EPA) and the Departent of Labor give high priority to assure research on health and safety risks in the production and disposal of sodium azide. Appended are an automobile passive restraints survey of insurance companies and comments by the Dept. of Transportation, Dept. of Labor, and the EPA.

by Elmer B. Staats
General Accounting Office, Washington, D.C. 20548
Rept. No. CED-79-93 ; 1979 ; 138p refs
Availability: General Accounting Office, DHISF, Box 6015, Gaithersburg, Md. 20760

HS-026 956

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT

A project was conducted to develop preliminary design specifications for a speed advisory system applicable during periods of reduced visibility (fog). Needed facilities, equipment, and proce-ures were developed to conduct controlled experiments under arying levels of fog density. A series of interrelated experiments was conducted to identify optimum advisory information sign messages and speed values) and the number, location, and nterconnection between signs which would result in the smoothest traffic flow. Based on information from these experiments as well as pertinent literature, preliminary specifications were developed for a full-scale speed advisory system usable on public highways. The interrelated experiments involved six separate studies: determining speeds drivers normally follow at varying levels of reduced visibility with no special signing; determining which of three major percentile speeds (15th, 50th, and 85th) would produce the smoothest traffic flow when used as a posted speed; identifying driver response when other vehicles are present on the highway under reduced visibility conditions; investigating the effect of different types, amounts, and display characteristics of advisory signing; exploring the utility of centerline and edgeline delineation; and determining the effect of unreliable information presentation by advisory signing systems. Forms and procedural information relevant to the project are appended.

by Donald R. Wagner; Dwayne K. Hofstetter
Oregon State Dept. of Transportation, State Hwy. Div., State Hwy. Bldg., Salem, Oreg. 97310
DOT-FH-11-7950
Rept. No. FHWA-RD-78-32 ; 1978 ; 187p 11refs
Rept. for Sep 1972-Mar 1978.
Availability: NTIS

HS-026 957

A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA

A sample of 225 prosecution reports for persons driving under the influence (DUI) of alcohol or drugs in Washington, D.C., was selected for this survey. Reports were obtained through a computer list of all police radio runs for driving under the influence from Jan 1 through Aug 31, 1978. Blood alcohol content (BAC) of apprehended persons was studied to determine consumption patterns of various age groups. Data were obtained on State of residence, race, automobile ownership, attitudes, type of alcohol consumed, consent to test for alcohol content, type of vehicle operated, time of arrest, arrests by day of the week, age, location of arrests by police district, and sex. Among the findings are: the largest percentage of persons arrested for DUI were 31-35 and 20-25 years-of-age; 58.9% of the 20-25 age group were white (in a predominantly black population); early morning hours accounted for the largest number of DUI arrests, and most of these occurred on weekends; most persons arrested for DUI attracted police attention by committing another traffic violation (driving on the wrong side of the street, not maintaining the proper traffic lane); there is direct correlation between weekend DUI arrests and accidents caused by drunk drivers; older age groups recorded higher BAC'S than younger groups; and traffic fatalities involving drunk drivers follow the time-of-day and weekend patterns established by arrests and traffic accidents.

by W. Fred Thompson
Metropolitan Police Dept., Traffic and Special Operations Div., 501 New York Ave., N.W., Washington, D.C. 20037
1979 ; 46p
Availability: Corporate author

HS-026 958

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS

Response of the University of Michigan's Highway Safety Res. Inst. (HSRI) to the National Highway Traffic Safety Administration (NHTSA) proposed regulation of air brake systems for heavy trucks is presented. Federal Motor Vehicle Safety Standard 121 was implemented by the NHTSA in 1975 to regulate the braking performance of heavy trucks. To assess the impact of this standard, the NHTSA sponsored a 1976-1977 HSRI monitoring study of accidents involving heavy trucks built before and after the standard was enacted. Findings showed that accident rates of trucks complying with the standard were not significantly lower than those of prestandard trucks. The 1979 Advance Notice of Proposed Rulemaking reflects concern that trucks be directionally stable and controllable while braking at deceleration levels necessary to comply with stopping-distance requirements. The HSRI response covers issues associated with the establishment of good braking performance (normal braking situations versus minimum stopping-distance requirements, compromises between braking and stability, and one standard for all commercial vehicles versus the variety of vehicle configurations in use). HSRI comments specifically address four questions: whether requirements of Standard No. 121 should be retained or suspended, and whether these requirements, without the presence of an antilock system, compromise the stability of heavy commercial vehicles; whether a 60-mph stopping-distance requirement should be reinstated in order to prevent the depowering of brakes; whether different stopping-distance requirements should be considered for various test conditions; and whether standards should allow the demonstration of compliance using test procedures which permit wheel lockup as long as the vehicle can be retained within a 12-foot lane. It is considered that issues inherent in regulating heavy truck braking are similar to those encountered in developing other standards to improve automotive safety, fuel economy, and exhaust emissions.

by L. Segel; P. Fancher; R. Ervin; T. Gillespie; C. Winkler; C. MacAdam
Publ: HSRI Research Review v9 n6 p1-16 (May-Jun 1979)
1979
Availability: See publication

HS-026 959

NONCOMPLIANCE WITH HAZARDOUS MATERIALS SAFETY REGULATIONS. SPECIAL STUDY

The National Transportation Safety Board investigated eight serious transportation accidents that involved hazardous materials in transit. Accidents occurred in air, rail, and highway carrier operations. Noncompliance with hazardous materials safety regulations was found in such areas as packaging, labeling, recordkeeping/documentation, and quantity limits. A review of published reports and information about compliance with hazardous materials safety regulations elicited little useful data, since none of the literature discussed reasons for noncompliance. Information was obtained by questionnaire from 11 Federal agencies involved in establishing or maintaining complaince. Interviews were conducted nationwide with about 100 persons in the transportation industry, including shippers, freight forwarders, crating companies, railroads, air carriers, steamship companies, truck lines, and local delivery firms. These interviews provided case histories of actual experience with hazardous materials shipment problems and reasons for noncompliance with regulations. Government and industry agreed on the perceived reasons for noncompliance: complexity and incomprehensibility of regulations; industry interrelationship complexities; economic pressures; unawareness of regulations; lack of training for inexperienced personnel; and indifference. Four recommendations are offered to reduce noncompliance: to expedite the ongoing DOT program of evaluating every hazardous materials safety regulation, to publish nonemergency amendments to regulations on a regular basis, to expand the Materials Transportation Bureau compliance program, and to expand the hazardous materials regulations compliance assurance program. Additional information on accidents involving hazardous materials and the compliance issue is appended.

National Transportation Safety Board, Bureau of Technology, Washington, D.C. 20594
Rept. No. NTSB-HZM-79-2 ; 1979 ; 59p 7refs
Availability: NTIS

HS-026 960

TEENS, DRUGS AND ALCOHOL: ON THE ROAD AGAIN

The relation between teenage drug and alcohol use and driving is considered. Government estimates indicate that 3,932 drinking drivers between 15-20 years of age were involved in fatal motor vehicle accidents during 1977 in which 4,657 persons died. Both the National Inst. on Drug Abuse and the National Hwy. Traffic Safety Administration suspect that increased use of drugs other than alcohol adversely affects traffic accident statistics. A 1977 survey of high school seniors showed that 6 of every 10 seniors had used some type of illicit drug. Other than alcohol and nicotine, marijuana was the most widely used. In a 1977 Gallup poll, most of the teenagers asked about their involvement in accidents thought the reason was drinking, drugs, or reckless driving. Research has proven that marijuana adversely affects driving ability immediately after use and increases the user's chance of being involved in an accident. Driver simulator studies show that although marijuana does not affect a driver's visual search ability, the drug does alter a driver's ability to coordinate visual searching with vehicle control. Also, drivers under the influence of marijuana are usually unaware of impairment. Many young people do not understand how much alcohol they can consume before driving ability is impaired, and do not perceive serious consequences in getting stopped by police for the possession of alcoholic beverages. One study demonstrates that teenagers perceive less danger in driving after marijuana use than after alcohol consumption. The importance of teenage drug education programs is stressed. In a separate section, an example is given of increased insurance rates for persons convicted of driving under the influence of alcohol or drugs.

Publ: Journal of American Insurance v54 p1-5 (Fall-Winter 1978)
1978
Availability: See publication

HS-026 961

METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR

Comparative heat flux ratings of materials used in automotive seat fabrication were derived to provide information on physiological changes associated with minor heat stress. Because heat stress and metabolic heat retention are major contributing factors to discomfort, fatigue, reduced visual acuity, and performance decrements, trim materials and other constituents of seating devices were studied to evaluate their effect on heat dissipation. Forty-five trim cover materials, 16 trim pads, and five foam cushion pads were examined for impedance to body heat loss by evaporation, conduction, convection, and radiation. The tests were designed to determine the rate per unit of surface area at which heat was transferred through materials. Metabolic retention during relatively high environmental temperature contributed to increased orthostatic intolerance, discomfort, and reduced performance levels. Inappropriate seat trim cover materials added to the vehicle operator's metabolic heat retention problem. It was determined that metabolic heat must be dissipated from the body area in contact with the seat, especially when air conditioning is not available. Trim cover material selected for use in body contact areas must have a high index of "breathability" or a high heat flux value. Recommended heat flux values are noted; the minimum desirable value was established as 24 BTU/sq ft/hr.

by Edmund J. Glassford; Esar Shvartz
Rept. No. SAE-790289 ; 1979 ; 8p 16refs
Presented at Congress and Exposition, Detroit, 26, Feb-2 Mar 1979.
Availability: SAE

HS-804 104

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS

A study was conducted by the National Hwy. Traffic Safety Administration to determine if drivers whose licenses are suspended or revoked (S/R), and who continue to operate vehicles, are involved in more traffic crashes, and particularly in more fatal car crashes, than the general driving population. Findings revealed that S/R drivers are over-represented in fatal crashes and are probably over-represented in all crashes. S/R drivers had a high incidence of reported drinking (alcohol) in fatal crashes, and S/R drivers were more frequently male than female. The largest target group included males between 20-34 years of age who were over-represented in fatal crashes by about 50%. Uniformity in traffic data reporting by states is lacking. More information is needed on the percentage of S/R drivers in the general driving population at a given time. Suspension and revocation for financial responsibility reasons does not necessarily indicate an unsafe driver. S/R drivers must be viewed in terms of the total system and how they can be effectively treated. Recommendations to strengthen state programs focus on the accuracy and completeness of data on S/R drivers, the development of effective ways to cope with the problem of S/R drivers who continue to drive, the prosecution of drivers, the filing of charges, the probability of S/R drivers being detected, and making the sanction for S/R driving appropriate to the offense. Appended are a description of a traffic enforcement/driver control system in California and tabular data.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 47p refs
Prepared in cooperation with the American Assoc. of Motor Vehicle Administrators.
Availability: GPO

HS-804 461

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT

Areas of research involved in evaluating industry's capability to produce fuel efficient vehicles are documented. Engine-driveline changes are considered as an important contribution to fuel economy and the meeting of emission standards. Through extensive synthesis of vehicle specifications and other data, chronological presentations were developed to illustrate engines and transmissions in production, engine/transmission and model/engine combinations, and automatic vs. manual transmission availability. Also shown are the progression of engine/driveline changes from 1975 through 1978; the correlation of these changes with new vehicle introductions; the restrictions on available drivetrain options due to emission requirements; and technological improvements including dieselization, fuel metering, lock-up torque converters, and front-wheel-drive. Methodology is described; summary data and commentary for General Motors, Ford, Chrysler, and American Motors Corp. are included, with supporting detailed information (Engine/Driveline Product Schedules) in the appendices.

by Theodore Taylor, Jr.; Alan R. Cunningham; Dominic A. Iannelli

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DOT/TSC-1383

Rept. No. DOT-TSC-NHTSA-79-29.II ; 1979 ; 143p 1ref

Rept. for Jun 1977-Aug 1978. Vol. 1 is HS-804 460; Vols. 3-4 are HS-804 462--HS-804 463.

Availability: NTIS

HS-804 463

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT

Areas of research involved in evaluating industry's capability to produce fuel efficient vehicles are documented. An analysis of automotive engine manufacturing, conducted to determine the impact of regulatory changes on tooling costs and the production process, is presented. The 351W CID V-8 engine at Ford's Windsor No. 1 Plant was the subject of the analysis. A review of plant history and its product is presented, along with an analysis of manufacturing operations, including material and production flow, plant layout, machining and assembly processes, tooling, supporting facilities, inspection, service and repair. An assessment of the impact on manufacturing methods and cost due to four levels of product change intensity is given. Machines and facilities are illustrated in photographs and diagrams.

by Theodore Taylor, Jr.

Corporate-Tech Planning, Inc., 275 Wyman St., Waltham, Mass. 02154

DOT/TSC-1383

Rept. No. DOT-TSC-NHTSA-79-29.IV ; 1979 ; 132p 4refs

Rept. for Jun 1977-Aug 1978. Vols. 1-3 are HS-804 460--HS-804 462.

Availability: NTIS

HS-804 523

THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT

Important variables affecting passenger car tire rolling resistance are identified. The influence of speed, load, and inflation pressure is discussed, and test data are presented that encompass a wide variety of tires (bias and radial) over a range of rim diameters and tire aspect ratios. Measurements of tire rolling resistance are given, along with equations for converting rolling resistance obtained on drums to equivalent values on the road. Mechanical parameters of tire rolling loss are considered in relation to fuel consumption. Measurement methods and data reduction in rolling loss measurements are appended.

by S. K. Clark; R. N. Dodge
Regents of the Univ. of Michigan, Ann Arbor, Mich. 48109
DOT-TSC-1031
Rept. No. DOT-TSC-NHTSA-79-28 ; 1979 ; 72p 6refs
Availability: NTIS

HS-804 623

REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT

Revision of three National Hwy. Traffic Safety Administration (NHTSA) curriculum packages for emergency medical techicians (refresher, dispatching, and crash victim extrication courses) is discussed. Each of 16 curriculum packages was evaluated and ranked according to 10 criteria devised by the contractor and the NHTSA, and three packages were selected for revision. General editorial and stylistic changes were made. Other revisions directed at particular needs of individual packages included the updating of content and the improvement of teaching effectiveness. Field trials of refresher and crash victim extrication packages were conducted, and packages were revised on the basis of findings. Information on responsibilities and knowledge required of emergency medical technicians and the field test evaluation forms are appended.

by Z. Glasgow; M. L. Simkins; T. P. Stamp
Applied Science Associates, Inc., Box 158, Valencia, Pa. 16059
DOT-HS-6-01376
1977 ; 77p
Rept. for 1 Jun 1976-30 Dec 1977.
Availability: NTIS

HS-804 731

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT

The National Hwy. Traffic Safety Administration (NHTSA) issued 1981-1984 Fuel Economy Standards for Passenger Automobiles in June 1977. In December 1978, General Motors and Ford began claiming that reduced standards would slow the rate of car price increases and therefore save consumers money. The cost-benefit analysis encompassed such factors as oil consumption and prices, the balance of trade, national security, technology assessment, consumer prices and benefits, consumer net benefits, and fuel conservation. Emission requirements were also addressed. After a review of information on which General Motors and Ford claims were based, the NHTSA concluded that the initiation of rulemaking to reduce standards was not warranted.

National Hwy. Traffic Safety Administration, Office of Automotive Fuel Economy Standards, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 88p
Availability: NTIS

HS-804 732

TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT

Twenty-four pairs of truck tires were tested for braking and cornering traction on two wet pavements at speeds of 40 and 55 mph. Locked wheel braking force coefficient, peak braking force coefficient, and peak lateral force coefficient were measured. The 24-pair sample was used to predict the traction performance of the truck tire population. Comparisons were made between truck tire and automobile tire populations, and correlations between various traction properties of truck tires were computed. Variability between "identical" tires in traction performance was predicted. The traction performance of tire cornering properties in accident avoidance is discussed.

by Pat L. Boyd; Art H. Neill, Jr.; John A. Hinch
ENSCO, Inc., 5408A Port Royal Rd., Springfield, Va. 22151
NHTSA-9-6227
Rept. No. ENSCO-1306 ; 1979 ; 74p 11refs
Availability: NTIS

HS-804 771

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT

by Susan E. Henson
Ford Motor Co., Automotive Safety Office, P.O. Box 2053, Dearborn, Mich. 48121
DOT-HS-6-01446
1978 ; 37p refs
Rept. for 15 Sep 1976-30 Nov 1978. For abstract, see HS-804 772.
Availability: NTIS

HS-804 776

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT

Results are presented of a study directed toward anticipating consumer behavior toward motor vehicles redesigned to meet Federally-legislated automotive fuel economy standards. Automotive design changes already being implemented include weight reduction, reduction in engine size, and the introduction of diesel engines. The results are based on five different research approaches: focus group interviews, a literature review of existing consumer research, further analysis of previously collected data sets, scenario analyses by experts familiar with the auto market, and examinations of time-series data. A general resistance to government regulations was found within all market segments, but specific attitudes towards automotive fuel economy rules differ systematically by vehicle market segment. Small-car drivers tend to be open-minded, but large-car and light-truck drivers believe that vehicle downsizing is leading to a noticeable deterioration in motor vehicle quality. Negative reaction to future fuel-efficient vehicles is strongly influenced by dissatisfaction with the reliability and durability records of some existing domestic subcompact cars. Evidence suggests that light-truck drivers are well satisfied with their vehicles because of their versatility, fuel economy, durability, safety, ease of maint nance, and interior space.

Charles River Associates, 200 Clarendon St., Boston, Mass. 02116
DOT-HS-7-01779
1979 ; 201p refs
Report for Oct 1977-Apr 1979. For summary report, see HS-80 775.
Availability: NTIS

HS-804 787

LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT

Data concerning physical, operating, performance, and mark characteristics of light-duty trucks for model years 1972 an 1975-1977 are compiled. The data are stored on tape in th computer system of the Transportation Systems Center, Can bridge, Mass. Information from published and unpublishe sources is provided, with extrapolation and correlations mad when raw data were not available. Vehicles are reported b model year and are grouped by manufacturer using productio volume, model, body type, engine displacement, transmissio and gross vehicle weight class attributes as criteria to sele representative vehicle configurations. Models essentially dupl cated by more than one division of a manufacturer are repr sented by attributes of only one duplicate model. Productio volume for both models is then combined. Characteristics ar documented for vehicles representing total U.S. sales of dome tic and imported light-duty trucks. It is recommended that th data base be expanded to include all years from 1955 to th present, and that further studies include the uses of light truck and types and sizes of loads usually carried, with resultin effects on fuel economy.

by C. Cantwell
Chilton Co., 201 King of Prussia Rd., Radnor, Pa. 19089
DOT-TSC-1338
Rept. No. DOT-TSC-NHTSA-79-37 ; 1979 ; 60p refs
Rept. for Mar-Nov 1977.
Availability: NTIS

HS-804 830

THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT

Work of the Portuguese Coordinating Committee of the Can paign for Traffic Safety is reported. The campaign involv cooperation between representatives of government and priva agencies; it has the full support of the media. An essenti feature of the campaign has been its effective use of brochure handouts, and posters to inform and motivate the public (exan ples provided, with translation). The coordinating committ realizes that efforts in the field of traffic safety cannot be eval ated solely in terms of accident statistics. It emphasizes th global context of behavioral changes in individuals to mal them respect the rights of others, respect themselves, and che ish the rights they enjoy.

by Richard A. Ibison
National Hwy. Traffic Safety Administration, Office of Vehicl Safety Standards, Washington, D.C. 20590
1978 ; 63p
Rept. for May-Dec 1978. Safety brochure in English and Portuguese.
Availability: NTIS

HS-804 835

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT

An evaluation is presented of the Mobile ORBIS III Speed Enforcement Demonstration Project in Arlington, Texas, which detects and photographs speeders (recording speed, time, date, driver, and license). The device was installed in a van and its performance was evaluated at four sites over a 3-month period. Sites were selected to provide data on the impact of the unit in various road environments (rural, residential, urban, and urban thoroughfare) with differing posted speed limits. Each site was evaluated at 25% and 50% enforcement levels. The greatest impact in reductions of percent speeders was realized on urban roads at the high enforcement level, with a general reduction in speeders realized throughout 0.5-mile test segments. Significant but less dramatic reductions were observed at rural and residential sites where the lower enforcement level appeared to be more effective. Speed distribution profile data showed a small decrease in mean speeds at three of the four sites; the impact of the unit lasted for some time after the van was removed from operation. Although an administrative evaluation of the project showed the mobile ORBIS III unit to be less cost-effective than standard patrol techniques, evaluation indicated the unit's cost-effectiveness could be considerably improved with the design and operation of appropriate patrol strategies. Information on statistical analysis techniques and samples of warning and citation letters are appended. It is noted that the National Hwy. Traffic Safety Administration does not support the cost/effectiveness analysis of the report, since the project was not designed for that purpose.

by Charles B. Dreyer; Thomas E. Hawkins
City of Arlington, Tex., Dept. of Traffic and Transportation, Arlington, Tex.; Southwest Res. Inst., San Antonio, Tex.
DOT-HS-346-3-692
1976 ; 50p
Rept. for Aug 1975-Jun 1976.
Availability: NTIS

HS-804 839

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT

Automobile repairs were evaluated in seven U.S. cities (Atlanta, Ga.; Philadelphia, Pa.; Miami, Fla.; Nashville, Tenn.; Houston, Tex.; and White Plains and Brooklyn, N.Y.). Project personnel worked closely with the district attorney's office in each city. A reputable repair facility was used as the secure facility, providing inspection space and master mechanics. Sixty-two cars were inspected at secure facilities and documented. Engine and suspension malfunctions were induced into the cars, and the cars were reinspected and repairs documented. Results indicate that 39% of the cars had unnecessary brake, engine, or suspension repair; 20% of the cars did not have induced malfunctions repaired; and 51% of the cars were over-repaired or under-repaired with respect to brakes, engine, or suspension system. A list of candidate agency action items, information on the data reduction procedure, and a detailed list of repairs are appended.

by Burton L. Jones; Joesph F. Peters; Bernard J. Schroer
University of Alabama, Kenneth E. Johnson Environmental and Energy Center, P.O. Box 1247, Huntsville, Ala. 35807
DOT-OS-90004
Rept. No. UAH-220 ; 1979 ; 79p 6refs
Availability: Corporate author

HS-804 851

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT

The development and testing of predictive models for identifying individuals with a high risk of alcohol-related (AR) crash involvement are described. Six groups of drivers at high risk of AR crashes were identified from a literature review and an analysis of North Carolina accident data: 16-20 year old males; 21-24 year old males; persons with prior driving under the influence convictions; persons with three or more moving violations; persons recently divorced; and persons recently released from prison. A seventh control group represented a one-tenth sample of the general driving population. Using North Carolina data through 1974, predictive models were developed for each group to predict 1975 AR accident involvement proportions for subgroups within each high-risk group. Prospective analysis of predictive capabilities using 1976 car crash data revealed that, in general, models effectively identified driver subgroups with the highest risk of AR crash involvement. Since most information used in model development is available in most government jurisdictions, the models can be adapted for use in other areas. The major drawback to widespread model use is the lack of demonstrably effective countermeasure programs that significantly reduce the rate of AR crash involvement for identified driver subgroups. Appendixes contain the alcohol model study record format, information on predicted probabilities of AR crash involvement, design matrices and model coefficients, and prospective validity test frequency distributions.

by John H. Lacey; J. Richard Stewart; Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center, South Campus, CPT 197A, Chapel Hill, N.C. 27514
DOT-HS-5-01250
1979 ; 162p 40refs
Rept. for Jun 1975-Jun 1978. Vol. 2 is HS-804 733.
Availability: NTIS

HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT

The preparation and testing procedures are reported for a windshield defrosting and defogging systems test series on light duty trucks. Tests were conducted to evaluate FMVSS 103 under idle and road load conditions at various wind velocities. The vehicle under test was a 1978 Ford LN600 flat bed truck (VIN-N62EVAJ7432). The test equipment included a drive-in chamber, an engine rpm recording and control system, and recording systems for temperature, road load roller speed, and wind velocity. Incorporated into the drive-in chamber were two heat exchangers with blower systems. A pre-cooled solvent was circulated through the heat exchangers to maintain ambient temperature. Ten windshield test patterns were made. Test data sheets, photographs, and an equipment list are provided.

by G. Valenzuela
Approved Engineering Test Labs., P.O. Box 4158, Fullerton, Calif. 92631
DOT-HS-7-01816
Rept. No. AETL-771-2487-1 ; 1978 ; 295p
Availability: Reference copy only

HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT

The preparation and testing procedures are reported for a windshield defrosting and defogging systems test series on light duty trucks. Tests were conducted to evaluate FMVSS 103 under idle and road load conditions at various wind velocities. The vehicle under test was a 1978 Chevrolet G20 Sportvan (VIN-CGL268U148081). The test equipment included a drive-in chamber, an engine rpm recording and control system, and recording systems for temperature, road load roller speed, and wind velocity. Incorporated into the drive-in chamber were two heat exchangers with blower systems. A pre-cooled solvent was circulated through the heat exchangers to maintain ambient temperature. Ten windshield test patterns were made. Test data sheets, photographs, and an equipment list are provided.

by G. Valenzuela
Approved Engineering Test Labs., P.O. Box 4158, Fullerton, Calif. 92631
DOT-HS-7-01816
Rept. No. AETL-771-2487-2 ; 1978 ; 211p
Availability: Reference copy only

HS-804 862

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT

The preparation and testing procedures are reported for a windshield defrosting and defogging systems test series on light duty trucks. Tests were conducted to evaluate FMVSS 103 under idle and road load conditions at various wind velocities. The vehicle under test was a 1977 GMC Sierra 15 pickup truck (VIN-TCD147Z508510). The test equipment included a drive-in chamber, an engine rpm recording and control system, and recording systems for temperature, road load roller speed, and wind velocity. Incorporated into the drive-in chamber were two heat exchangers with blower systems. A pre-cooled solvent was circulated through the heat exchangers to maintain ambient temperature. Ten windshield test patterns were made. Test data sheets, photographs, and an equipment list are provided.

by G. Valenzuela
Approved Engineering Test Labs., P.O. Box 4158, Fullerton, Calif. 92631
DOT-HS-7-01816
Rept. No. AETL-771-2487-3 ; 1978 ; 251p
Availability: Reference copy only

HS-804 883

STATE MOTORCYCLE SAFETY ACTIVITIES

Statistical information on state motorcycle safety activities was gathered from several sources, including the Fatal Accident Reporting System, the Federal Hwy. Administration, the National Hwy. Traffic Safety Administration (NHTSA), and state highway safety plans for fiscal year 1979. The report is intended to depict the increasing motorcycle fatality rate and to encourage remedial action. Motorcycle registration increased from 4,964,000 in 1975 to 5,138,000 in 1978 (3.5%), while motorcycle fatalities increased from 3,189 in 1975 to 4,554 in 1978 (4.1%). Miles of travel by motorcycles increased by 1.4% between 1975 and 1978, but the fatality rate per 100 million vehicle miles of travel for motorcycles in 1978 was 19.5, six times that for all other motor vehicles. As states repeal or weaken their helmet laws, increasing numbers of motorcyclists do not wear protective headgear, thus increasing the risk of serious injury or death. Both human and financial costs of motorcycle accidents are high. In an effort to reduce risks associated with motorcycle operation, NHTSA'S motorcycle program emphasizes the need for improved rider education and training, comprehensive licensing and screening procedures, promotion of approved headgear safety aspects, increased conspicuity of motorcycles, and education of other motor vehicle operators to make them more aware of motorcyclists and to recognize motorcyclists' rights. A summary analysis of motorcycle fatalities, fatality rates, registrations, and helmet laws by state is provided. Data on fatalities and registrations, helmet law status, and motorcycle countermeasure activities planned by states and reported in their 1979 highway safety plans are evaluated.

National Hwy. Traffic Safety Administration, Office of State Program Assistance, 400 Seventh St., S.W., Washington, D.C. 20590
1980? ; 53p
Availability: Corporate author

HS-805 118

DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT

A review is made of the status of state laws which provide for administrative action against the drivers license of a person who fails to appear in court to answer a traffic charge. Three different approaches are described. The unilateral approach involves suspension of the driving privilege of the person failing to appear, and is not based on any agreement with other states, although it can be applied to nonresidents. The driver license bail approach refuses to return the license which the arrested person has deposited in lieu of bail, on failure to appear; this is usually limited to residents. The reciprocal approach involves a bilateral and multilateral agreement with other states, usually providing that if a resident of one state is arrested in another he will be released upon signing his promise to appear; if he fails, the home state agrees to suspend his driving privilege until he does. The Commentary analyzes state laws following these approaches, evaluating some of the strengths and weaknesses of each, but limiting itself to those laws which address the problem through administrative action against the driving privilege.

by John W. English
National Com. on Uniform Traffic Laws and Ordinances, Suite 430, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036
DOT-HS-5-01121
Publ: Traffic Laws Commentary v8 n6 55p (1979)
1979 ; refs
Availability: GPO

HS-805 161

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT

In a study designed to identify and establish a Motor Vehicle Materials High-Volume Industrial Processing Cost Data Bank for a light truck, the following two methods were used: a micro-analysis, in which costs were generated using the automotive industry type estimation techniques, and a macro-analysis, in which costs were determined for a study of 8 years of an automotive corporation's historical financial records. In the micro-analysis method, a 1978 light truck was dismantled, components and subassemblies were analyzed in detail to determine the weight, manufacturing method, and estimated manufacturing cost associated with each item. From the basic data, other categorical costs were estimated, such as a total cost for each item and a cost per pound. The various items were grouped into several levels of assemblies on a basis of practiced industry groupings to produce total cost categories of the complete vehicle. The macro-analysis produced data for substantiating the micro-analysis data. The program developed technical data in manual chart form applicable to a computerized cost data bank, that can be used as a reference base for implementing a simplified building-block estimation system to facilitate the estimating task, to establish standardized across-the-board estimation procedures, and to generate credible consumer cost estimates for proposed rule-making actions. The application of this data to other vehicles should be made only after studies indicate a similarity in design. The micro-analysis cost data, macro-analysis study, and photographs of components of the specimen vehicle are appended.

by Malcolm R. Harvey; Clifford B. Eckel; David Cowan; Robert F. McLean
John Z. DeLorean Corp., P.O. Box 427, Bloomfield Hills, Mich. 48013
DOT-HS-7-01770
1978 ; 434p
Rept. for Oct 1977-Oct 1978
Availability: NTIS

HS-805 195

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS

A quarterly summary report is given on defect campaigns conducted by domestic and foreign manufacturers. Following a summary of tabulations of motor vehicle safety defect recall campaigns, information is given on domestic and foreign automobile manufacturers recall campaigns, including the NHTSA identification number, date of company notification, make, model, model year, a brief description of the defect and the manufacturer's corrective action, number of pages on file, and number of vehicles recalled. The recall campaigns involve passenger cars, station wagons, motorhomes, travel vans, trucks (light, medium and heavy), fire trucks, diesel trucks, transit coaches, buses and minibuses, motorcycles, mopeds, United Parcel Service vehicles, and tractor/trailers. Similar information is presented on campaigns by manufacturers of equipment and tires. The status of domestic and foreign campaigns completed as of 30 June 1979 is included.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 44p
Availability: GPO

HS-805 197

ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT

Collisions reported in this study were performed under Contract DOT-HS-8-01886, "Test and Evaluation of Fuel System Integrity in Rear Impact Collisions," and establish data on rear impacts, a mode for which little data are presently available. The information includes documentation of trajectory, residual crush, braking and steering forces, and tire marks for each vehicle in each test. Pre- and post-test photographs are provided; the appended test results provide a staged collision trajectory and damage data summary for each test, together with the data sheets used in its generation.

by R. Pirtle
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
NHTSA-8-0323; Ref: DOT-HS-8-01886
Rept. No. 3010-78-47 ; 1978 ; 218p
Rept. for Jan-Apr 1978.
Availability: NTIS

HS-805 200

UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT

A parametric design analysis was performed to define the characteristics of protection devices which could be incorporated on the rear end of highway trailers in order to avoid automobile vehicle underride in a crash situation. The study was particularly concerned with the effect of weight and cost of the devices as they relate to parameters such as load capacity, guard height, restriction of the rear sliding bogie movement, and energy attenuation. Four separate design concepts were developed and compared on the basis of weight, cost, and slider restriction. Included were rigid as well as energy absorbing design approaches. Results have generally indicated that the energy absorbing guard approach has the best potential from a weight efficiency standpoint, and that significant modifications will be required to the trailer structure to absorb the impact loads under consideration. Further analysis of the trailer structure response and required reinforcement is recommended; a mass model analysis similar to that developed by National Hwy. Traffic Safety Administration and employed by The Budd Co. in assessing automobile crashworthiness is suggested to determine the interaction between the vehicles in the crash event. Recommendations for further study include the degree and nature of damage which would be sustained by plastic deformations within the trailer structure and their effect on the vehicle, and the effectiveness and weight of energy absorbing guards. A program of scale model and full scale testing is also recommended. Background information on scale model techniques as employed by the Budd Co. Technical Center is appended, as are weight tabulations.

by G. P. McCafferty
Budd Co., Technical Center, 375 Commerce Dr., Fort Washington, Pa. 19034
DOT-HS-9-02289
Rept. No. TCR-0584-1 ; 1979 ; 59p
Rept. for Oct-Nov 1979.
Availability: NTIS

HS-805 201

REPEATABILITY OF VISIBILITY TESTS. FINAL REPORT

Tests were carried out to provide information on current production vehicles with regard to repeatability in making measurements of obstructions to visibility and of the fields of view through the rear view mirror system. Three tests were made on each vehicle: International Harvester Diesel Tractor Transtar 4300, Ford Econoline Van E-100, and AMC Concord 4-Door Sedan. Tests were conducted as prescribed in the National Highway Traffic Safety Administration's proposed standards on "Fields of Direct View" (Docket 70-7, Notice 5), and "Rearview Mirror Systems" (Docket 71-3a, Notice 4). For the rearview mirror systems, only the ambinocular fields of view were measured. In general, there was good repeatability on the direct fields of view measurements. Minor difficulties were encountered in positioning some of the mirrors repeatably. Test procedures are appended, followed by the data on the three vehicles, with photographic documentation.

by E. Enserink
Dynamic Science Inc., Talley Industries Co., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-8-01967
Rept. No. 3044-79-178 ; 1979 ; 243p
Rept. for Apr-Sep 1979.
Availability: NTIS

HS-805 202

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT

An accident investigation and coding training program for personnel in the National Crash Severity Study is described. A two-day session for working investigators in that study was designed to eliminate inconsistencies between teams. These ranged from a lack of uniformity in field collection of vehicle and scene data through poor photography, inadequate number or type of photographs, incorrect measurements, inconsistencies in rating injury and Collision Deformation Classification (CDC), and improperly completed interviews. Major emphasis in the program was on scene investigation and documentation, vehicle evaluation and documentation, rating the CDC and Abbreviated Injury Scale/Occupant Injury Classification (AIS/OIC) injury scales, photography, and the use of the CRASH program. Two training films, one on scene investigation and one on vehicle evaluation, were also produced. In evaluating the session, the majority of trainees felt the training should have been held earlier in the program, and that similar courses as refreshers would be beneficial. Topics thought to be most useful, in the order mentioned, were vehicle evaluation and measurement, Calspan Reconstruction of Accident Speeds on the Highway (CRASH), photography, interviewing, CDC, injury coding and scene measurement. Lists of instructors and attendees are attached, and the program syllabus is appended.

by John W. Garrett
Calspan Field Services, Inc., P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-6-01442
Rept. No. ZP-6003-V-3 ; 1978 ; 98p refs
Availability: NTIS

HS-805 203

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT

A review of test data obtained from both manual and automatic seat belt equipped Chevrolet Chevettes and VW Rabbits indicated that the chest accelerations of both driver and front seat passenger, when restrained by either system, were comparable. However, the Head Injury Criteria (HIC) for both driver and passenger restrained by the automatic system were about half those of the manual system; the forward motion of the dummy restrained by the automatic seat belt was much less than that of the dummy restrained by the manual belt. This can be partly ascribed to the difference in belt length; the automatic belt system has the potential of reducing belt stretch to less than half that of the manual system, greatly improving head protection. The other consideration, absence of lap belt in the automatic system, permits the occupant to remain upright instead of jackknifing about the lap belt. Results were similar in both Chevette and VW Rabbit tests, indicating that their automatic belt systems have the potential of offering improved protection over current active belt systems.

by John B. Morris
National Hwy. Traffic Safety Administration, Office of Passenger Vehicle Res., 400 7th St., S.W., Washington, D.C. 20590
1979 ; 10p 7refs
Testing performed by Dynamic Science, Inc. and Approved Engineering Test Labs.
Availability: NTIS

HS-805 209

REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT

The Calspan Reconstruction of Accident Speeds on the Highway (CRASH) computer program was revised in order to improve the accuracy of reconstructions, enhance the convenience of applications, and extend generality. The analytical bases for the program modifications are documented.

by Raymond R. McHenry; James P. Lynch
Calspan Field Services, Inc., P.O. Box 400, Buffalo, N.Y. 14225
DOT-HS-6-01442
Rept. No. ZP-6003-V-1 ; 1979 ; 95p 11refs
Rept. for Oct 1977-Aug 1978.
Availability: NTIS

HS-805 210

THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT

The Restraint Systems Evaluation and the National Crash Severity Study utilized a "towaway" threshold for inclusion of accident vehicles in their samples; this will be the major criterion for much of the National Accident Sampling System as well. In order to demonstrate the possible effects of biases in a data base restricted to towaway accidents, an accident file containing both towaway and non-towaway accidents is required, along with information on vehicle drivability; the 1976 North Carolina and 1975 New York accident files meet these criteria and were selected for use in the analysis. Data sources and analysis procedure are discussed, as well as principal findings and their implications. The independent variables most closely associated with post-crash vehicle driveability are identified, and accident and injury characteristics, along with seat belt usage and effectiveness estimates, are compared as a function of the sampling criterion. Compared with all accidents, injury rates are overestimated in towaway accidents, while restraint usage and belt effectiveness are underestimated. Results indicate that there are differences between accident data based on a towaway criterion and those based on a typical statewide reporting threshold (e.g., personal injury and/or property damage exceeding $200). Most configurations such as high speed, front-end impacts, which result in more severe accidents would be overrepresented in such data bases; this should be accounted for when noninjury or minor injury accidents are the focus of a study. When the injury criterion is relatively serious, the towaway sample will exclude only approximately 1.5% of the fatalities and only 4.6% of the serious injuries.

by Amitabh K. Dutt; Donald W. Reinfurt
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
DOT-HS-4-00897
1979 ; 66p 7refs
Rept. for 1 Oct 1977-31 Dec 1978.
Availability: NTIS

HS-805 214

SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT

Seven seriously injured traffic victims and their families were interviewed in order to have them describe, in their own words, the long-term personal and social consequences of serious traffic accidents. Taped interviews, usually lasting two hours, were held in the respondents' homes, the discussion concerning the financial, psychological and family consequences of their injuries. There was great difficulty in contacting suitable informants. In future studies, access to medical records would provide a more valid assessment of physical trauma and a more reliable means of contacting victims who have moved since the accident. The Abbreviated Injury Scale and the Injury Severity Score are inadequate indicators of the long-term personal and social consequences resulting from serious traffic injuries. The victim with the lowest ISS rating appeared to have suffered the most severe consequences from her injury. Most respondents indicated a fatalistic attitude towards the use of seat belts. A modest study of the effects of spinal cord injuries is recommended, as well as independent interviews with other family members. It is also recommended that the use of AIS ratings for predicting social consequences be supplemented by additional information such as the age, sex and occupation of the accident victim.

by Donald Callaway; Charles Drucker
NHTSA-8-A0516
1979 ; 23p 3refs
Rept. for May 1978-Jan 1979.
Availability: NTIS

HS-805 218

AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY

Human consequences of traffic accidents for victims and their families are explored in order to educate the public about the seriousness of the problem. Seven severely injured victims of traffic accidents in two California counties (Alameda and Contra Costa) were interviewed to elicit data on long-term personal and social consequences of serious traffic accidents. An attempt was made to conduct interviews in an informal and relaxed atmosphere, usually in the person's home. Interviews lasted about two hours, and respondents were offered payment of $8.00 per hour. Victims talked extensively about the impact of accidents on such areas as work, finances, and recreation. They were occasionally reluctant to discuss the impact on such personal and sensitive areas as emotional problems. Four victim interviews are reviewed in detail, and a brief examination of the other three interviews is provided. Considerations for additional study are cited.

National Hwy. Traffic Safety Administration, (Washington, D.C. 20590)
1979 ; 17p
Availability: Corporate author

HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE

This updated course guide is an aid to the administrator in planning and managing a training program in emergency medical care for those who are apt to be the first persons responding to an accident. The course objective is to improve the quality of emergency medical care rendered to victims of accidents and illnesses. The three main sections of the course guide focus on the instructional program, course planning considerations, and course management and evaluation. No prior training or experience in the emergency medical care field is required of the course applicant. Upon successful completion of the program, the trainee will be proficient not only in providing basic emergency care but also in taking any actions necessary to minimize patient suffering and to prevent further injury. The instructional strategy is one of learning by doing. Each lesson provides for practice of the skills and knowledge covered in that lesson, wherever possible. In addition, special review and practice sessions are incorporated, and the course design provides for review and integration of course contents. The course consists of 28 lessons (including one optional lesson) involving a minimum of 40 hours in classroom and field training.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 14p refs
CLEARINGHOUSE TRAINING MATERIALS. Subject: Emergency Medical Care. Format: Course Guide. See also HS-900 026 and HS-900 027. Type of Audience: First Responders. Former title: Crash Injury Management for Traffic Law Enforcement Officers.
Availability: GPO, stock no. 050-003-00360-3

HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS

These updated lesson plans contain detailed outlines of course content and guidance for teaching each course lesson of a training program in emergency medical care for those who are apt to be the first persons responding to an accident. The course objective is to improve the quality of emergency medical care rendered to victims of accidents and illnesses. In general, lessons have been designed to be self-contained units. Lesson plans consist of four parts: objectives, requirements, reference(s), and outline. No prior training or experience in the emergency medical care field is required of the course applicant. Upon successful completion of the program, the trainee will be proficient not only in providing basic emergency care but also in taking any actions necessary to minimize patient suffering and to prevent further injury. The instructional strategy is one of learning by doing. Each lesson provides for practice of the skills and knowledge covered in that lesson, wherever possible. In addition, special review and practice sessions are incorporated, and the course design provides for review and integration of course contents. The course consists of 28 lessons (including one optional lesson) involving a minimum of 40 hours in classroom and field training.

National Hwy. Traffic Safety Administration, Washington, D.C.
20590
1979 ; 147p refs
CLEARINGHOUSE TRAINING MATERIALS. Subject:
Emergency Medical Care. Format: Instructor Lesson Plans. See
also HS-900 025 and HS-900 027. Type of Audience: First
Responders. Former title: Crash Injury Management for Traffic
Law Enforcement Officers.
Availability: GPO, stock no. 050-003-00361-1

HS-900 027

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE

This completely revised study guide is a training aid for students enrolled in a training program in emergency medical care designed for those who are apt to be the first persons responding to an accident. The course objective is to improve the quality of emergency medical care rendered to victims of accidents and illnesses. This guide has been prepared to inform the trainee of lesson objectives, coverage, and procedures, and to assist him in acquiring the skills and knowledge required for competent on-the-job performance as a first responder. A section for each course lesson is provided. For lessons in which new skills and knowledge are taught, the following format is employed: introductory paragraph describing lesson purpose and need, objectives, overview of lesson contents, study suggestions, and reference(s) on which the technical content is based. No prior training or experience in the emergency medical care field is required of the course applicant. Upon successful completion of the program, the trainee will be proficient not only in providing basic emergency care, but also in taking any actions necessary to minimize patient suffering and to prevent further injury. The instructional strategy is one of learning by doing. Each lesson provides for practice of the skills and knowledge covered in that lesson, wherever possible. In addition, special review and practice sessions are incorporated, and the course design provides for review and integration of course contents. The course consists of 28 lessons (including one optional lesson) involving minimum of 40 hours in classroom and field training.

National Hwy. Traffic Safety Administration, Washington, D.C.
20590
1979 ; 50p refs
CLEARINGHOUSE TRAINING MATERIALS. Subject:
Emergency Medical Care. Format: Student Study Guide. See
also HS-900 025 and HS-900 026. Type of Audience: First
Responders. Former title: Crash Injury Management for Traffic
Law Enforcement Officers.
Availability: GPO, stock no. 050-003-00362-0

INDEX to ABSTRACTS

blank page

KWOC Title Index

ABSOLUTE
THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

ACCESSIBILITY
RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

ACCESSOIRES
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

ACCESSORY
MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY
HS-026 834

ACTION
THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

ACTUATION
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

ADDITIVES
THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

ADMINISTRATORS
INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

ADVANCE
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

ADVERSE
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

ADVISORY
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

AERODYNAMIQUES
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

AFFORDED
THE PROTECTION AFFORDED BY SEAT BELTS
HS-026 844

AFTERMARKET
THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

AGE
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

AGENCIES
TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

AIR
AIR BAGS: A SPECIAL ISSUE
HS-026 925

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

ALCOHOL
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

TEENS, DRUGS AND ALCOHOL: ON THE ROAD AGAIN
HS-026 960

AMERICAN
AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY
HS-805 218

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS HS-026 938

ANALYSES
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES HS-026 933

ANEMOMETER
LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE HS-026 859

ANEMOMETRY
GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY HS-026 861

ANSWERS
FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE HS-026 829

ANTIHISTAMINES
THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE HS-026 838

ANTILOCK
SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT HS-026 945

ANTIOXIDANT
BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS HS-026 901

ANY
ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS]. HS-026 795

APPEAR
DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT HS-805 118

APPLIED
FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING HS-026 806

APPRECIATES
NOBODY APPRECIATES THE TIRE. FACTS ABOUT TREADWEAR HS-026 904

APU
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT) HS-026 863

ARLINGTON
MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT HS-804 835

ARRESTED
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA HS-026 957

AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS HS-026 837

ASSEMBLY
RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION HS-026 939

ASSESSMENT
ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT HS-026 880

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT HS-804 461

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT HS-804 463

THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME HS-026 897

ASSOCIATION
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT HS-026 943

ATHANOL
ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE) HS-026 884

ATTENDANCE
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS HS-026 951

ATTENUATORS
IMPACT ATTENUATORS SAVE LIVES, VEHICLES HS-026 804

AUSTRALIA
COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS HS-026 890

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

AUSWAHL

SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

AUTHORITY

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

AUTO

AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY
HS-805 218

AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

COLLEGE STUDIES AUTO BODY REPAIR PROBLEMS
HS-026 852

MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY
HS-026 834

VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]
HS-026 797

AUTOMATED

RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION
HS-026 939

AUTOMATIC

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

AUTOMOBILE

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

AUTOMOBILE INSURANCE--1978
HS-026 842

COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

DESIGN FOR ECONOMY [AUTOMOBILE ENGINES]
HS-026 807

ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

AUTOMOBILES

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

AUTOMOTIVE

ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY
HS-026 915

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT
HS-804 463

BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

FUTURE AUTOMOTIVE TECHNOLOGY. A RESEARCH BLUEPRINT
HS-026 847

THE GREAT AUTOMOTIVE DEBATE
HS-026 794

AUTOS

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

AUXILIARY

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

AVEC

SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

AXLES

TEST OF SELF-STEERING TRAILER AXLES
HS-026 812

BAC

AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

BAGS

AIR BAGS: A SPECIAL ISSUE
HS-026 925

BAND

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

BANK

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

BARRICADES

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

BARRIERS

CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

EVALUATION OF TIMBER BARRICADES AND PRE CAST CONCRETE TRAFFIC BARRIERS FOR USE I HIGHWAY CONSTRUCTION AREAS
HS-026 93

RECENT DEVELOPMENTS IN THE FIELD OF AC CESSIBILITY TO THE BUILT ENVIRONMENT I THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 82

BASE

LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

BATTERY

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

BEARING

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

BEARINGS

CERAMICS IN ROLLING ELEMENT BEARINGS
HS-026 865

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

BED

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

BEHAVIOR

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-804 776

BEHAVIOUR

ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR
HS-026 889

BELT

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

BELTS

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

THE PROTECTION AFFORDED BY SEAT BELTS
HS-026 844

BICYCLE

FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING
HS-026 806

BIOMASS
ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

BIOMASSE
ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

BIRTHDAY
CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

BLOOD
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

BLUEPRINT
FUTURE AUTOMOTIVE TECHNOLOGY. A RESEARCH BLUEPRINT
HS-026 847

BOARD
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

BODY
COLLEGE STUDIES AUTO BODY REPAIR PROBLEMS
HS-026 852

BOOSTERS
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

BOUND
BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

BRAKE
ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS].
HS-026 795

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

BRAKING
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

BREMSEN
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

BRIDGE
SAFETY AT NARROW BRIDGE SITES
HS-026 914

BUILT
RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

BUS
DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)
HS-026 919

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)
HS-026 917

NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS
HS-026 921

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

SCHOOL BUS DRIVER HIRING TECHNIQUES
HS-026 916

BUSES
NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS
HS-026 921

BUTADIENE
BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

CALLS
ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY
HS-026 915

CAMIONS
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

CAMPAIGN
THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

CAMPAIGNS
SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

CAMPANHA
THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

CANADA
ACCIDENT FATALITIES, CANADA 1976
HS-026 828

CAPABILITY
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

CAPABLE
EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

CAR
ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS].
HS-026 795

ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)
HS-026 903

AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE
HS-026 829

IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?
HS-026 853

CARBON
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

CARGO
CARGO SECURITY LITERATURE SURVEY
HS-026 954

CARS
CARS THAT DON'T PROTECT YOU IN A CRASH
HS-026 948

GM'S NEW X-CARS
HS-026 940

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

LITTLE CARS: THEIR TIME HAS COME
HS-026 833

RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)
HS-026 851

CASE
SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 – CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

CASTINGS
COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

CASUALTIES
COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

CERAMICS
CERAMICS IN ROLLING ELEMENT BEARINGS
HS-026 865

CHARACTERISTICS
LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

CHECK
THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM
HS-026 905

CHEVETTE
SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

CHEVROLET
SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

CHILD

CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

CHILDHOOD

CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS
HS-026 818

HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS
HS-026 823

CHILDREN

CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS
HS-026 820

THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN
HS-026 824

CHIPS

THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

CHRYSLER

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

CIRCUIT

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

CITIZENS

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

CITY

100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)
HS-026 843

CIVIL

EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

CLAIM

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

CLAIMED

100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)
HS-026 843

CLASSROOM

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

CLAYBROOK

ENGINE REPAIR: A MESSAGE FROM JOAN CLAYBROOK
HS-026 947

CLOSED

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

CLOSER

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

CLUTCH

MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

CODING

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

COLD

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

COLLEGE

COLLEGE STUDIES AUTO BODY REPAIR PROBLEMS
HS-026 852

COLLISION

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

COLLISIONS
ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

COLORADO
NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS
HS-026 921

COLUMBIA
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA
HS-026 957

COMBUSTIBLE
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

COMBUSTION
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE
HS-026 859

COMMAND
VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

COMMENT
HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

COMMISSION
CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS
HS-026 818

COMMUNITIES
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

COMMUNITY
EFFECTS OF TRANSPORTATION ON THE COMMUNITY
HS-026 808

COMMUTER
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

COMPARISONS
AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

COMPARTMENTS
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

COMPENDIUM
FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

COMPONENTS
COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

COMPOUNDS
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

COMPTROLLER
PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

COMPULSORY
COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

COMPUTER
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT
HS-805 209

CONCENTRATION
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

CONCRETE
EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

CONGRESS
PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CON-

GRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

CONSCIOUS

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

CONSEQUENCES

EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

CONSISTENCY

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

CONSTRUCTION

ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)
HS-026 928

CONTAINERS

CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

CONTAINS

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

CONTRACTORS

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

CONTROL

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

CORNERING

TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

CORRECTION

CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

COST

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

COSTLY

SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION
HS-026 885

COUNTERMEASURES

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

COUNTY

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)
HS-026 919

COURSE

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE
HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

COURT

DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT
HS-805 118

COVERAGES

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

CRANKSHAFT
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

CRASH
CARS THAT DON'T PROTECT YOU IN A CRASH
HS-026 948

COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT
HS-805 209

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

CRASHES
AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY
HS-805 218

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

CROSSINGS
OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

CROSSLINKED
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

CURRICULUM
REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

CURVE
ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR
HS-026 889

CUT
REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS
HS-026 803

CYCLES
MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

CYCLIC
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

CYCLING
FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING
HS-026 806

MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

CYCLISTS
MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

CYLINDER
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

DEATH
HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS
HS-026 823

REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS
HS-026 803

DEATHS
HIGHWAY DEATHS SIGNAL 'EPIDEMIC'
HS-026 805

OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

DEBATE
THE GREAT AUTOMOTIVE DEBATE
HS-026 794

THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

DEFECTIVE
AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 79

DEFOGGING

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

DEFROSTING

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

DEKALB

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)
HS-026 919

DELAYED

WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

DELINEATION

EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

DELIVERY

THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME
HS-026 897

DEMONSTRATION

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

DEPARTMENT

ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

DEPT

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

DESIGN

CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

DESIGN FOR ECONOMY [AUTOMOBILE ENGINES]
HS-026 807

UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT
HS-805 200

DESIGNING

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

DESIGNS

RISK ANALYSIS IN MAINTAINABLE DESIGNS
HS-026 952

DETROIT

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

DEVELOPMENTS

ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS].
HS-026 795

RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

DEVICES

OPTIONAL SAFETY DEVICES: HOW STRICT THE LIABILITY?
HS-026 789

SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

DEXCHLORPHENIRAMINE

THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

DIAGNOSE

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

DIAGNOSTICS

APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

DIET

MAKING THE MILEAGE. THE ENGINEER'S DIET. PT. 2

HS-026 836

DIMENSIONAL

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT

HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT

HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT

HS-026 943

DISTRICT

A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA

HS-026 957

DIVE

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)

HS-026 909

DJ

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEFS

HS-026 938

DOCTOR

ROAD TRAFFIC ACCIDENTS: THE DOCTOR'S POINT OF VIEW

HS-026 840

DOCTRINE

EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?

HS-026 827

DOPPLER

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE

HS-026 859

DRAG

SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)

HS-026 893

DRIKE

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)

HS-026 909

DRINE

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)

HS-026 909

DRINK

EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?

HS-026 827

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)

HS-026 909

DRIVE

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)

HS-026 802

DRIVEN

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)

HS-026 863

DRIVER

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)

HS-026 919

EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY

HS-026 922

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)

HS-026 917

ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR

HS-026 889

SCHOOL BUS DRIVER HIRING TECHNIQUES

HS-026 916

VIRGINIA ESCORT DRIVER'S MANUAL

HS-026 907

DRIVERS

ACCIDENTS INVOLVING HANDICAPPED DRIVERS

HS-026 826

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)

HS-026 919

DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT

HS-805 118

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS

HS-804 104

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)

HS-026 917

NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS

HS-026 921

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT

HS-804 851

DRIVETRAIN
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

DRIVING
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA
HS-026 957

AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

DRUGS
TEENS, DRUGS AND ALCOHOL: ON THE ROAD AGAIN
HS-026 960

DRUNK
3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

DRUNKEN
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

DRUNKENNESS
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

DUTY
LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

ECONOMIES
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

ECONOMY
ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY
HS-026 915

DESIGN FOR ECONOMY [AUTOMOBILE ENGINES]
HS-026 807

FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

EDUCATION
STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

EFFECTIVENESS
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 – CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

EFFICIENT
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-804 776

EFFORTS
ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

EINSATZBEDINGUNGEN
SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

ELECTRIC
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME HS-026 897

100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE) HS-026 843

ELECTRICITY

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES HS-026 896

ELECTRICS

ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS HS-026 831

THE ELECTRICS ARE COMING HS-026 832

ELEMENT

CERAMICS IN ROLLING ELEMENT BEARINGS HS-026 865

EMERGENCE

EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES? HS-026 827

EMERGENCIES

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT HS-026 848

EMERGENCY

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE HS-900 027

ENCOUNTERED

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS HS-026 937

ENEL

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES HS-026 896

ENFORCEMENT

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT HS-804 835

ENGINE

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS HS-026 858

APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE HS-026 857

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT HS-804 461

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT HS-804 463

ENGINE REPAIR: A MESSAGE FROM JOAN CLAYBROOK HS-026 947

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE HS-026 860

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM–DEVELOPMENT AND OPERATIONAL EXPERIENCES HS-026 866

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY HS-026 861

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE HS-026 859

LEARNING TO LOVE THE PING [ENGINE KNOCK] HS-026 793

ENGINEER

MAKING THE MILEAGE. THE ENGINEER'S DIET. PT. 2 HS-026 836

ENGINES

DESIGN FOR ECONOMY [AUTOMOBILE ENGINES] HS-026 807

ENVIRONMENT

RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED] HS-026 822

THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN HS-026 824

TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT HS-026 923

EPIDEMIC

HIGHWAY DEATHS SIGNAL 'EPIDEMIC' HS-026 805

EPRI

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM HS-026 855

EQUIPMENT

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIP-

MENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

SELECTING TRANSMISSIONS FOR MOBILE EQUIPMENT
HS-026 814

ESCAPE
TRUCK ESCAPE RAMPS: EXITS TO SAFETY
HS-026 899

ESCAPING
EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

ESCORT
VIRGINIA ESCORT DRIVER'S MANUAL
HS-026 907

ETHANOL
ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

EV
100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)
HS-026 843

EVALUATION
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

EVIDENTIAL
THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

EXECUTIVE
EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT
HS-804 771

EXITS
TRUCK ESCAPE RAMPS: EXITS TO SAFETY
HS-026 899

EXPERIENCES
FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

EXPOSURE
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

FACILITIES
OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

FAHREN
HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

FAILURE
DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT
HS-805 118

FAMILY
AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY
HS-805 218

FAST
AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

FATALITIES
ACCIDENT FATALITIES, CANADA 1976
HS-026 828

FEASIBILITY
UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT
HS-805 200

FEDERAL

FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)
HS-026 908

FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 – CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

FHWA

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

FIELD

CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

FIRE

ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

FIRING

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

FISCAL

FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)
HS-026 908

FLAT

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

FLAWS

HELMET SUPPORTER SEES FLAWS IN OBJECTIONS
HS-026 898

FLEET

FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)
HS-026 908

FLORIDA

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

1978 TRAFFIC ACCIDENT FACTS: AN ILLUSTRATED ANALYSIS OF ACCIDENT RECORDS [FLORIDA]
HS-026 892

FLOW

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

FOIL

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

FORCE

FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

FORCES

FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING
HS-026 806

FORD

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

FOREIGN

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

FORGINGS

COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

FREQUENCIES

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

FUEL

ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY
HS-026 915

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-804 776

CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE
HS-026 829

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION
HS-026 885

THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

FUNCTION

RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

GAIN

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

GAS

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

GASOLHOLIC

ON BECOMING GASOLHOLIC
HS-026 835

GASOLINE

LIFE IN THE SLOW LINE [LINES AT GASOLINE STATIONS]
HS-026 816

GEOMETRY

ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR
HS-026 889

GEORGIA

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)
HS-026 919

GMC

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

GOAL

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

GOALS

FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

GOVERNMENT

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

GRAND

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

GROSSER

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

GUARD

UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT
HS-805 200

GUIDE

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE
HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

GUIDELINES

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

GUZZLING

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

HANDICAPPED

ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 826

RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

HANDLING

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

HAZARDOUS

NONCOMPLIANCE WITH HAZARDOUS MATERIALS SAFETY REGULATIONS. SPECIAL STUDY
HS-026 959

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

HAZARDS

HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS
HS-026 820

HEALTH

HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS
HS-026 823

HEARING

AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

HEARINGS

THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

HEAT

METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]
HS-026 797

HEATED

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

HEAVY

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

HELMET

HELMET SUPPORTER SEES FLAWS IN OBJECTIONS
HS-026 898

SEARCHLIGHT ON SAFETY [MOTORCYCLE HELMET USE]
HS-026 825

HIGHWAY

ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

HIGHWAY DEATHS SIGNAL 'EPIDEMIC'
HS-026 805

OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS
HS-026 803

REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIP-

MENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

HIRING

SCHOOL BUS DRIVER HIRING TECHNIQUES
HS-026 916

HISTORICAL

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

HISTORY

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

HITCHING

TRAILER WEIGHT AND HITCHING UP
HS-026 910

HIVER

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

HOUR

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)
HS-026 917

HYPNOSIS

ROAD HYPNOSIS
HS-026 791

IDLE

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

ILLUMINATION

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

IMPACT

ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

IMPACT ATTENUATORS SAVE LIVES, VEHICLES
HS-026 804

IMPACTS

EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

IMPLICATIONS

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

IMPROPER

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

IMPROVEMENT

EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

INDIVIDUAL

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

INDUSTRIAL

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

INDUSTRY

VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]
HS-026 797

INFILTRATE

ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS
HS-026 831

INFORMATION

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

INJECTED

APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

INJURY

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

INPUT

RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

INSPECTION

THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM
HS-026 905

INSTALLED

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

INSTITUTE

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

INSTRUCTOR

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

INSULATED

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

INSURANCE

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

AUTOMOBILE INSURANCE--1978
HS-026 842

INTAKE

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

INTERACTION

THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

INTERNAL

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE
HS-026 859

INVENT

IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?
HS-026 853

INVESTIGATION

ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

INVOLVEMENT

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

ISSUE

AIR BAGS: A SPECIAL ISSUE
HS-026 925

ITALIAN

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

JEEPS

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

KEEPING

EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

KILLER
HOW WE'LL RUN KILLER TRUCKS OFF THE ROADS
HS-026 830

KM
THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

KNOCK
LEARNING TO LOVE THE PING [ENGINE KNOCK]
HS-026 793

KRAFTSTOFF
ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

KUPPLUNGSBETATIGUNG
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

LABILE
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

LANGUAGE
VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

LARGE
CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

LASER
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE
HS-026 859

LATERAL
EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

LAYOUTS
TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

LEAP
ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY
HS-026 915

LEARNING
LEARNING TO LOVE THE PING [ENGINE KNOCK]
HS-026 793

LESSON
EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

LEVEL
USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

LIABILITY
LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

OPTIONAL SAFETY DEVICES: HOW STRICT THE LIABILITY?
HS-026 789

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

LICENSE
CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT
HS-805 118

LIFE
LIFE IN THE SLOW LINE [LINES AT GASOLINE STATIONS]
HS-026 816

LIFESAVER
OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

LIFT
ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS
HS-026 831

LIGHT
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST

VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

LIGHTER
COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

LIKE
IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?
HS-026 853

LIMIT
THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

LINE
LIFE IN THE SLOW LINE [LINES AT GASOLINE STATIONS]
HS-026 816

RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION
HS-026 939

LINES
LIFE IN THE SLOW LINE [LINES AT GASOLINE STATIONS]
HS-026 816

LININGS
REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS
HS-026 803

LIQUEFIED
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

LITERATURE
CARGO SECURITY LITERATURE SURVEY
HS-026 954

LITTLE
LITTLE CARS: THEIR TIME HAS COME
HS-026 833

LIVES
IMPACT ATTENUATORS SAVE LIVES, VEHICLES
HS-026 804

LN
WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

LOAD
WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

LONDON
THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME
HS-026 897

LOOK
IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?
HS-026 853

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

LOOKS
HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS
HS-026 820

LOSE
LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

LOSS
AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

LOSSES
AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

LOVE
LEARNING TO LOVE THE PING [ENGINE KNOCK]
HS-026 793

LUBRICANTS
THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

MAIL

AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

MAINTAINABLE

RISK ANALYSIS IN MAINTAINABLE DESIGNS
HS-026 952

MAINTENANCE

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)
HS-026 928

MAJOR

ADAMS CALLS FOR MAJOR LEAP IN AUTOMOTIVE FUEL ECONOMY
HS-026 915

MAN

IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?
HS-026 853

MANDATORY

AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

MANUAL

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

VIRGINIA ESCORT DRIVER'S MANUAL
HS-026 907

MANUFACTURERS

AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

MANUFACTURING

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT
HS-804 463

MARKING

EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

MARKINGS

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

MATCHES

CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

MATERIALS

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

NONCOMPLIANCE WITH HAZARDOUS MATERIALS SAFETY REGULATIONS. SPECIAL STUDY
HS-026 959

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

MEAN

3-D. 'DON' DRINK AN' DRINE'...UH, 'DON' DRIKE AND' DIVE'...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

MEASURE

USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

MEASUREMENTS

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE
HS-026 859

MECHANIC
ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)
HS-026 903

MECHANICAL
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

MECHANISCHE
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

MEDICAL
EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE
HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

MESSAGE
ENGINE REPAIR: A MESSAGE FROM JOAN CLAYBROOK
HS-026 947

METABOLIC
METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

MICROWAVES
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

MILE
100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)
HS-026 843

MILEAGE
MAKING THE MILEAGE. THE ENGINEER'S DIET. PT. 2
HS-026 836

MINNESOTA
MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)
HS-026 917

MIRROR
CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

MOBILE
MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY
HS-026 834

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

SELECTING TRANSMISSIONS FOR MOBILE EQUIPMENT
HS-026 814

MODEL
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT
HS-804 771

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

MODELS
AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

MONITOR
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

MONOXIDE
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

MOON
IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?
HS-026 853

MOTOR

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)
HS-026 908

FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

MOTORCYCLE

SEARCHLIGHT ON SAFETY [MOTORCYCLE HELMET USE]
HS-026 825

STATE MOTORCYCLE SAFETY ACTIVITIES
HS-804 883

MOTORED

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

MOTORS

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

MULTIPIECE

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...
HS-026 887

MUNITIONS

SAFE TRANSPORT OF MUNITIONS
HS-026 936

MVMA

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

NARROW

SAFETY AT NARROW BRIDGE SITES
HS-026 914

NATIONAL

REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

NATURAL
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

NBR
BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

NEGLIGENT
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

NHTSA
REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

NITRILE
BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

NOBODY
NOBODY APPRECIATES THE TIRE. FACTS ABOUT TREADWEAR
HS-026 904

NOISE
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

NONCOMPLIANCE
NONCOMPLIANCE WITH HAZARDOUS MATERIALS SAFETY REGULATIONS. SPECIAL STUDY
HS-026 959

NORMAL
FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING
HS-026 806

NOTICE
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

NUCLEAR
CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

NUTZFAHRZEUGREIFEN
SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

OBJECTIONS
HELMET SUPPORTER SEES FLAWS IN OBJECTIONS
HS-026 898

OBSERVED
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

OCCUPANTS
PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

OFFENDERS
3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

OFFS
POWER TAKE-OFFS FOR TRUCKS
HS-026 839

OGDEN
OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

OIL
THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

OILS
THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

OPERATION
OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION
HS-026 939

OPERATIONAL
FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

OPERATOR

METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

OPERATORS

AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

OPTIMIZATION

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT
HS-804 771

OPTION

SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION
HS-026 885

OPTIONAL

OPTIONAL SAFETY DEVICES: HOW STRICT THE LIABILITY?
HS-026 789

ORBIS

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

ORIENTED

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

PACKAGES

REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

PAEDIATRICIAN

HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS
HS-026 820

PAINT

THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

PARTIAL

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

PASSENGER

RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)
HS-026 851

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

PASSENGERS

WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

PASSIVE

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

PAVEMENT

EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

PAYLOAD

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

PEDESTRIAN

PEDESTRIAN ACCIDENTS
HS-026 819

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

PERFORMANCE

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

PERSONAL

USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

PERSONENKRAFTWAGEN
RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)
HS-026 851

PERSONS
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA
HS-026 957

PICKUP
WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

PIECE
MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...
HS-026 887

PILOT
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

PING
LEARNING TO LOVE THE PING [ENGINE KNOCK]
HS-026 793

PLANNING
TRAFFIC SAFETY PLANNING ON SCHOOL SITES
HS-026 854

PLANS
EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

PLASTICS
PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

PLATE
CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

PNEUMATIC
THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT
HS-804 523

PORTUGAL
THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

POSITION
EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

POWER
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

POWER TAKE-OFFS FOR TRUCKS
HS-026 839

PRACTICE
VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

PRECAST
EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

PREDICTING
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

PREDICTION
USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

PRELIMINARY
FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

PREPAREDNESS
THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

PRESCHOOL
THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN
HS-026 824

PRESSURE
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

PREVENTION
CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS
HS-026 818

PRINCIPLES
CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

PROBATION
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

PROBLEM
INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

PROBLEMS
COLLEGE STUDIES AUTO BODY REPAIR PROBLEMS
HS-026 852

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

PROCESS
FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 – CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

PROCESSING
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

PRODUCED
AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

PRODUCT
AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

PROJECT
CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

PROPANE
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE
HS-026 829

PROPERTIES
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

PROPERTY
EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

PROTECT
CARS THAT DON'T PROTECT YOU IN A CRASH
HS-026 948

PROTECTION
CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

THE PROTECTION AFFORDED BY SEAT BELTS
HS-026 844

PROTOTYPE
WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

PSYCHOLOGY
TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT
HS-026 923

PUBLIC
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

PULSE
WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

PULSED
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

QUALITY
RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]
HS-026 797

QUESTIONS
FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE
HS-026 829

RABBIT
SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

RABBITS
AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

RADIAL
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

RADIO
THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

RAIL
WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

RAILROAD
OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

RAMPS
TRUCK ESCAPE RAMPS: EXITS TO SAFETY
HS-026 899

RANDOM
MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

RANGE
100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)
HS-026 843

RANKS
ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS
HS-026 831

RATES
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

RATINGS
RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

REACTIONS
REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

REAR
ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

REARVIEW
CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

RECALL
SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

RECENT
RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

RECORDS
1978 TRAFFIC ACCIDENT FACTS: AN ILLUSTRATED ANALYSIS OF ACCIDENT RECORDS [FLORIDA]
HS-026 892

REDUCE
OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

REDUCED
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

REDUCING
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

REDUCTION
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

REFLECTORIZED
REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS
HS-026 803

REGIMEN
PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

REGULATE
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

REGULATIONS
NONCOMPLIANCE WITH HAZARDOUS MATERIALS SAFETY REGULATIONS. SPECIAL STUDY
HS-026 959

REGULATORY
REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

RELIABILITY
RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)
HS-026 851

REPAIR
COLLEGE STUDIES AUTO BODY REPAIR PROBLEMS
HS-026 852

ENGINE REPAIR: A MESSAGE FROM JOAN CLAYBROOK
HS-026 947

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

REPAIRS
ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)
HS-026 903

REPEATABILITY
REPEATABILITY OF VISIBILITY TESTS. FINAL REPORT
HS-805 201

REPERCUSSIONS
AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY
HS-805 218

REPRESENTATIVE
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

REQUESTS
REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

RESEARCH
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

FUTURE AUTOMOTIVE TECHNOLOGY. A RESEARCH BLUEPRINT
HS-026 847

RESIDENTIAL
EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

RESISTANCE
THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT
HS-804 523

RESPONDER
EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE
HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

RESPONSE
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

RESTRAINT
CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

RESTRAINTS
PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

RESULTING
THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

RESULTS
AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

RETENTION
METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

REVISION

REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT

HS-804 623

REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT

HS-805 209

REVOKED

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS

HS-804 104

RIDE

RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT

HS-026 545

RIGHT

THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM

HS-026 905

RIPOFF

ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)

HS-026 903

RISK

COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION

HS-026 934

RISK ANALYSIS IN MAINTAINABLE DESIGNS

HS-026 952

RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION

HS-026 939

TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT

HS-804 851

RISKS

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...

HS-026 887

ROAD

COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS

HS-026 890

HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS

HS-026 820

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE

HS-026 809

ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR

HS-026 889

ROAD HYPNOSIS

HS-026 791

ROAD TRAFFIC ACCIDENTS: THE DOCTOR'S POINT OF VIEW

HS-026 840

SKANDIA REPORT 3. "UNPROTECTED ROAD USERS"

HS-026 821

TEENS, DRUGS AND ALCOHOL: ON THE ROAD AGAIN

HS-026 960

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT

HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT

HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT

HS-804 862

ROADS

HOW WE'LL RUN KILLER TRUCKS OFF THE ROADS

HS-026 830

ROADWAY

REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS

HS-026 803

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)

HS-026 928

RODOVIARIA

THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT

HS-804 830

ROLLER

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)

HS-026 863

ROLLING

CERAMICS IN ROLLING ELEMENT BEARINGS

HS-026 865

THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT

HS-804 523

ROULENT

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)

HS-026 802

RUBBER

BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS

HS-026 901

EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

RULEMAKING
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

RUN
HOW WE'LL RUN KILLER TRUCKS OFF THE ROADS
HS-026 830

RURAL
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

SAFE
SAFE TRANSPORT OF MUNITIONS
HS-026 936

SAVE
IMPACT ATTENUATORS SAVE LIVES, VEHICLES
HS-026 804

SAVING
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

SBR
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

SCENE
MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

SCHEDULES
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

SCHEME
THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME
HS-026 897

SCHOOL
DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)
HS-026 919

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)
HS-026 917

NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS
HS-026 921

SCHOOL BUS DRIVER HIRING TECHNIQUES
HS-026 916

TRAFFIC SAFETY PLANNING ON SCHOOL SITES
HS-026 854

SEARCHLIGHT
SEARCHLIGHT ON SAFETY [MOTORCYCLE HELMET USE]
HS-026 825

SEAT
AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

THE PROTECTION AFFORDED BY SEAT BELTS
HS-026 844

WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

SECURITY
CARGO SECURITY LITERATURE SURVEY
HS-026 954

THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM
HS-026 905

SEES
HELMET SUPPORTER SEES FLAWS IN OBJECTIONS
HS-026 898

SEGURANCA
THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

SELECTING
SELECTING TRANSMISSIONS FOR MOBILE EQUIPMENT
HS-026 814

SELECTION
SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

SELECTIVE

SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT

HS-804 839

SELF

TEST OF SELF-STEERING TRAILER AXLES

HS-026 812

SEND

IF WE CAN SEND A MAN TO THE MOON, WHY CAN'T WE RE-INVENT THE CAR? WHAT WILL THE CAR OF THE FUTURE LOOK LIKE?

HS-026 853

SENSIBLE

SENSIBLE SENSOR

HS-026 924

SENSOR

SENSIBLE SENSOR

HS-026 924

SENSORY

RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT

HS-026 545

SERVICE

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT

HS-026 848

SERVICES

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE

HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS

HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE

HS-900 027

SEVERITY

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT

HS-805 202

SHIELDING

EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE

HS-026 810

SHIPPING

CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS

HS-026 935

SICH

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)

HS-026 802

SIERRA

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT

HS-804 862

SIGNAL

HIGHWAY DEATHS SIGNAL 'EPIDEMIC'

HS-026 805

SIGNALING

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT

HS-026 929

SIGNING

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT

HS-026 929

SIGNS

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT

HS-026 881

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT

HS-026 953

SIMULATION

COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION

HS-026 934

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT

HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT

HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT

HS-026 943

SINGLE

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...

HS-026 887

SITES

SAFETY AT NARROW BRIDGE SITES

HS-026 914

TRAFFIC SAFETY PLANNING ON SCHOOL SITES

HS-026 854

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)

HS-026 928

SKANDIA

SKANDIA REPORT 3. "UNPROTECTED ROAD USERS"

HS-026 821

SLOW

LIFE IN THE SLOW LINE [LINES AT GASOLINE STATIONS]
HS-026 816

SMALL

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

SOCIAL

SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT
HS-026 923

SOCIETY

HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS
HS-026 823

SPECIFIC

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

SPEED

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

SPEEDS

AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

SPORTVAN

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

SPURIOUS

CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

SSOM

SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT
HS-804 771

STABILIZED

BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

STAGED

ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

STAMINA

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

STANDARD

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

STANDARDS

REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

STATEMENT

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

STATES

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

STATEWIDE

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

STATIONS

LIFE IN THE SLOW LINE [LINES AT GASOLINE STATIONS]
HS-026 816

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

STATISTICAL

FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

STEADY

VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

STEERING
TEST OF SELF-STEERING TRAILER AXLES
HS-026 812
THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM
HS-026 905

STOPPING
ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS].
HS-026 795

STRAINER
THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

STRICT
OPTIONAL SAFETY DEVICES: HOW STRICT THE LIABILITY?
HS-026 789

STUDENT
EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

STUDYING
THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

STYRENE
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

SUGGESTIONS
CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS
HS-026 818

SUPPORTER
HELMET SUPPORTER SEES FLAWS IN OBJECTIONS
HS-026 898

SURVEY
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA
HS-026 957
CARGO SECURITY LITERATURE SURVEY
HS-026 954
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839
SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

SURVEYS
CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

SUSPENDED
INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

SUSPENSION
THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM
HS-026 905

SUSPENSIONS
DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT
HS-805 118

SWEDEN
THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN
HS-026 824

SWEDISH
CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS
HS-026 818

SYMBOL
SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

SYMBOLS
SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

SYNFUELS
SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION
HS-026 885

SYNTHETIC
THE GREAT DEBATE. SYNTHETIC OILS AND LUBRICANTS, AFTERMARKET OIL ADDITIVES, AND THE "IF" FACTOR
HS-026 912

TANK
THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

TASK
FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

ECHNOLOGY
FUTURE AUTOMOTIVE TECHNOLOGY. A RESEARCH BLUEPRINT
HS-026 847

EENS
TEENS, DRUGS AND ALCOHOL: ON THE ROAD AGAIN
HS-026 960

ELEPHONES
MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY
HS-026 834

ELEVISION
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

EMPERATURE
COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

EMPORARY
CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

ENDER
EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

ENNESSEE
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

EST
CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

TEST OF SELF-STEERING TRAILER AXLES
HS-026 812

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

TESTING
COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

TESTS
COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

REPEATABILITY OF VISIBILITY TESTS. FINAL REPORT
HS-805 201

TEXAS
MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-304 835

THEORY
VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

THOUGHTS
MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

THRESHOLD
THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

TIE
WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

TIMBER
EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

TIME
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

LITTLE CARS: THEIR TIME HAS COME
HS-026 833

TIRE
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

NOBODY APPRECIATES THE TIRE. FACTS ABOUT TREADWEAR
HS-026 904

TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

TIRES

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...
HS-026 887

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT
HS-804 523

TOLLS

REFLECTORIZED ROADWAY LININGS CUT HIGHWAY ACCIDENT, DEATH TOLLS
HS-026 803

TORT

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

TOWAWAY

THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

TRACTION

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

TRAFFIC

CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS
HS-026 820

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

ROAD TRAFFIC ACCIDENTS: THE DOCTOR'S POINT OF VIEW
HS-026 840

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN
HS-026 824

TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT
HS-026 923

TRAFFIC SAFETY PLANNING ON SCHOOL SITES
HS-026 854

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

WYOMING TRAFFIC ACCIDENT FACTS 1978
HS-026 813

1978 TRAFFIC ACCIDENT FACTS: AN ILLUSTRATED ANALYSIS OF ACCIDENT RECORDS [FLORIDA]
HS-026 892

TRAILER

TEST OF SELF-STEERING TRAILER AXLES
HS-026 812

TRAILER WEIGHT AND HITCHING UP
HS-026 910

TRAINING

DRIVER TRAINING IN DEKALB COUNTY, GEORGIA (SCHOOL BUS DRIVERS)
HS-026 919

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE
HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)
HS-026 917

NEW BUSES AND NEW TRAINING FOR COLORADO (SCHOOL BUS) DRIVERS
HS-026 921

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

STATEWIDE INSTRUCTOR TRAINING GOAL OF FLORIDA DEPT. OF EDUCATION
HS-026 918

TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

TRANSMISSIONS

SELECTING TRANSMISSIONS FOR MOBILE EQUIPMENT
HS-026 814

TRANSPORT

SAFE TRANSPORT OF MUNITIONS
HS-026 936

TRANSPORTATION

ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

EFFECTS OF TRANSPORTATION ON THE COMMUNITY
HS-026 808

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

TRAVELERS

THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

TREADWEAR

NOBODY APPRECIATES THE TIRE. FACTS ABOUT TREADWEAR
HS-026 904

TRUCK

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...
HS-026 887

SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

TRUCK ESCAPE RAMPS: EXITS TO SAFETY
HS-026 899

TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

TRUCKS

CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS
HS-026 831

HOW WE'LL RUN KILLER TRUCKS OFF THE ROADS
HS-026 830

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

POWER TAKE-OFFS FOR TRUCKS
HS-026 839

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST

VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

TURBINE

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

TVA

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

TYPE

FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

UH

3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

ULTIMATE

MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY
HS-026 834

UNCERTAIN

SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION
HS-026 885

UNDERRIDE

UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT
HS-805 200

UNIT

A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

UNITED

PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

UNNECESSARY

ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)
HS-026 903

UNPROTECTED

SKANDIA REPORT 3. "UNPROTECTED ROAD USERS"
HS-026 821

UNSERE

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

USER

USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

USERS

SKANDIA REPORT 3. "UNPROTECTED ROAD USERS"
HS-026 821

UTAH

OGDEN, UTAH'S ONE-OF-A-KIND BUS. MOBILE CLASSROOM CONTAINS SAFETY TRAINING FACILITIES
HS-026 920

UTILITY

SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

VALIDATION

VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

VALLEY

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

VALUE

THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

VALUES

EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

VAN

THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME
HS-026 897

VARIATIONS

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

VEHICLE

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)
HS-026 908

FEDERAL TASK FORCE ON MOTOR VEHICLE GOALS BEYOND 1980. VOL. 3. APPENDICES. PRELIMINARY DRAFT REPORT
HS-026 849

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

100-MILE RANGE CLAIMED FOR CITY EV (ELECTRIC VEHICLE)
HS-026 843

VEHICLES

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERIENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-804 776

ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

IMPACT ATTENUATORS SAVE LIVES, VEHICLES
HS-026 804

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

VELOCITY

GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

VENDOR

VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]
HS-026 797

VERSION

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

VERSTARKER

MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

VICTIM

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

VICTORIA

COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

VIEWING

A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

VIOLENT

HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS
HS-026 823

VIRGINIA

VIRGINIA ESCORT DRIVER'S MANUAL
HS-026 907

VISIBILITY

REPEATABILITY OF VISIBILITY TESTS. FINAL REPORT
HS-805 201

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

VISUALIZATION

FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

VOITURES

HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

VOLKSWAGEN

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

VOLUME

DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

VW

SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

WEIGHT

LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

TRAILER WEIGHT AND HITCHING UP
HS-026 910

WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

WHEEL

THE ONLY WAY TO "DO IT RIGHT"..."WHEEL TO WHEEL" SECURITY CHECK...A COMPLETE 8-POINT INSPECTION OF THE STEERING AND SUSPENSION SYSTEM
HS-026 905

WHEELCHAIR

WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

WHEELS

MULTIPIECE VS SINGLE PIECE WHEELS. THERE ARE RISKS WITH TRUCK TIRES BUT...
HS-026 887

WHOLE

MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

WINDSHIELD

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

WINTER
HOW OUR CARS DRIVE IN WINTER (GRAND TEST: COMMENT ROULENT NOS VOITURES EN HIVER) (GROSSER TEST: SO FAHREN SICH UNSERE AUTOS IM WINTER)
HS-026 802

WIPE
WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

WIPER
WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

WISCONSIN
EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

WORK
SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)
HS-026 928

WYOMING
WYOMING TRAFFIC ACCIDENT FACTS 1978
HS-026 813

YOUNG
EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

ZONE
TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)
HS-026 928

ZONES
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

ZUVERLASSIGKEIT
RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)
HS-026 851

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Author Index

Adeyefa, B. A.
FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING
HS-026 806

Albaugh, Larry R.
RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION
HS-026 939

Anderson, H. L.
WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)
HS-026 928

Arnberg, Peter W.
THE TRAFFIC ENVIRONMENT OF PRESCHOOL CHILDREN IN SWEDEN
HS-026 824

Asanuma, T.
GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

Asogwa, S. E.
ROAD TRAFFIC ACCIDENTS: THE DOCTOR'S POINT OF VIEW
HS-026 840

Backstrom, Kerstin
CHILDHOOD ACCIDENTS. SUGGESTIONS MADE BY THE SWEDISH STATE COMMISSION FOR THE PREVENTION OF CHILDHOOD ACCIDENTS
HS-026 818

Bajaria, H. J.
RISK ANALYSIS IN MAINTAINABLE DESIGNS
HS-026 952

Barnes-Moss, H. W.
DESIGN FOR ECONOMY [AUTOMOBILE ENGINES]
HS-026 807

Becker, J. M.
VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

Becker, Judith M.
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

Bedard, Patrick
MAKING THE MILEAGE. THE ENGINEER'S DIET. PT. 2
HS-026 836

Bennett, R. O.
VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

Bennett, Robert O.
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

Bernhardt, Winfried
ETHANOL FROM BIOMASS AS AUTOMOTIVE FUEL (ATHANOL AUS BIOMASSE ALS KRAFTSTOFF FUR AUTOMOBILE)
HS-026 884

Bersch, Charles F.
CERAMICS IN ROLLING ELEMENT BEARINGS
HS-026 865

Billing, A. M.
TEST OF SELF-STEERING TRAILER AXLES
HS-026 812

Birnie, Susan
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

Black, Bruce D.
OPTIONAL SAFETY DEVICES: HOW STRICT THE LIABILITY?
HS-026 789

Bossi, A.
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

Bowman, Bruce M.
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

Boyd, Pat L.
TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

Bracco, F. V.
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

Breston, Barbara E.
EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

Briggs, G. J.
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

Bronstad, Maurice E.
CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

Bulman, D. N.
VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

Callahan, Joseph M.
LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

Callaway, Donald
SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

Cantwell, C.
LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

Carrier, Herb
NOBODY APPRECIATES THE TIRE. FACTS ABOUT TREADWEAR
HS-026 904

Ceppos, Rich
ON BECOMING GASOLHOLIC
HS-026 835

Cerullo, Bob
ARE YOU A RIPOFF MECHANIC? (UNNECESSARY CAR REPAIRS)
HS-026 903
WIPE OUT (GM DELAYED PULSE WINDSHIELD WIPER MOTOR)
HS-026 902

Chueng, P.
USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

Clark, S. K.
THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT
HS-804 523

Claybrook, Joan
ENGINE REPAIR: A MESSAGE FROM JOAN CLAYBROOK
HS-026 947

Council, Forrest M.
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

Cowan, David
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

Cropley, A. J.
TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT
HS-026 923

Cunningham, Alan R.
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

Cutting, D.
CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

Daniels, Jeff
ANY PROGRESS IN STOPPING? [CAR BRAKE DEVELOPMENTS].
HS-026 795

Dobey, Rodney G.
MINNESOTA'S 56-HOUR DRIVER TRAINING PROGRAM (SCHOOL BUS DRIVERS)
HS-026 917

Dodge, R. N.
THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT
HS-804 523

Dreyer, Charles B.
MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

Drucker, Charles
SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

Dutt, Amitabh K.
THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

Eckel, Clifford B.
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

Ekchian, A.
FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

English, John W.
DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT
HS-805 118

Enserink, E.
REPEATABILITY OF VISIBILITY TESTS. FINAL REPORT
HS-805 201

Ervin, R.
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

Fallows, Pamela
SEARCHLIGHT ON SAFETY [MOTORCYCLE HELMET USE]
HS-026 825

Fancher, P.
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

Fancher, P. S.
SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

Ferraro, Ralph J.
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

Fisher, L. G.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Fisher, P. A.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Franks, H. M.
THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

Fuchs, Camil
EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

Fulchino, Ann R.
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

Furr, L. Whitehurst
SAFETY AT NARROW BRIDGE SITES
HS-026 914

Garretson, Marilee E.
THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

Garrett, John W.
TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

Gerlach, Lewis J.
COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

Gertler, Meric
REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

Gillespie, T.
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

Glasgow, Z.
REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

Glassford, Edmund J.
METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

Glennon, John C.
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

Gluck, H.
ROAD HYPNOSIS
HS-026 791

Good, M. C.
ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR
HS-026 889

Graham, Jerry L.
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

Gray, Stanley
FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

Grime, G.
THE PROTECTION AFFORDED BY SEAT BELTS
HS-026 844

Gruska, Gregory
RISK ANALYSIS IN MAINTAINABLE DESIGNS
HS-026 952

Gustafsson, Lars H.
HEALTH AND SOCIETY, 1. ACCIDENTS AND VIOLENT DEATH. CHILDHOOD ACCIDENTS
HS-026 823

Haddon, William , Jr.
CARS THAT DON'T PROTECT YOU IN A CRASH
HS-026 948

Hall, Fred L.
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810
EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811
REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

Harbaugh, David L.
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

Harvey, Malcolm R.
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

Harwood, Douglas W.
STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

Hathaway, W. T.
ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

Hauer, Ezra
CORRECTION OF LICENSE PLATE SURVEYS FOR SPURIOUS MATCHES
HS-026 815

Hawkins, Thomas E.
MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

Healey, A. J.
RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

Hensley, V. R.
THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

Hensley, W. J.
THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

Henson, Susan E.
SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT
HS-804 771

Herbert, D. C.
CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

Hirschberger, Hans Georg
RELIABILITY OF PASSENGER CARS (ZUVERLASSIGKEIT VON PERSONENKRAFTWAGEN)
HS-026 851

Hofstetter, Dwayne K.
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

Holmes, J. M.
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

Holt, Don
MOTOR CYCLES, CYCLISTS, CYCLING: SOME RANDOM THOUGHTS ABOUT THE WHOLE CYCLING SCENE
HS-026 911

Hooley, C. J.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Horvath, James W.
BOUND ANTIOXIDANT STABILIZED NBR (NITRILE BUTADIENE RUBBER) IN AUTOMOTIVE APPLICATIONS
HS-026 901

Hoult, D. P.
FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

Howard, Tony
THE GREAT AUTOMOTIVE DEBATE
HS-026 794

Hulburt, David A.
RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION
HS-026 939

Iannelli, Dominic A.
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

Ibison, Richard A.
ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 826
THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

Ivey, D. L.
SAFETY AT NARROW BRIDGE SITES
HS-026 914

Jackson, R. H.
HAZARDS TO CHILDREN IN TRAFFIC: A PAEDIATRICIAN LOOKS AT ROAD ACCIDENTS
HS-026 820

Janicki, Ed
PLASTICS: DETROIT'S PARTIAL REGIMEN FOR 'WEIGHT-CONSCIOUS,' GAS-GUZZLING AUTOS
HS-026 792

Jefferson, Robert M.
CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

Johnston, S. C.
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

Jones, Burton L.
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

Jones, Michael Anthony
RECENT DEVELOPMENTS IN THE FIELD OF ACCESSIBILITY TO THE BUILT ENVIRONMENT IN THE U.S.A. [BARRIERS TO THE HANDICAPPED]
HS-026 822

Joynes, B.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Kimball, C. E.
CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

Knapper, C. K.
TOWARDS A SOCIAL PSYCHOLOGY OF THE TRAFFIC ENVIRONMENT
HS-026 923

Kopec, R. J.
THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

Koziol, Joseph S. , Jr.
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

Kraegel, Martin W. , Jr.
SENSIBLE SENSOR
HS-026 924

Krage, Mark K.
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

Lacey, John H.
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

Lam, D. F.
USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

Layne, Norman R. , Jr.
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

Leadbetter, N. A.
VEHICLE HANDLING: STEADY-STATE THEORY AND PRACTICE
HS-026 845

Legomsky, Stephen H.
AUTO MANUFACTURERS AND HIGH SPEEDS: IS A FAST CAR A DEFECTIVE PRODUCT?
HS-026 790

Lienesch, John H.
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

Lisle, Frank N.
EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

Litant, I.
ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

Lynch, James P.
REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT
HS-805 209

MacAdam, C. C.
SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

MacAdam, C.
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

Marden, W. W.
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

Mazurowski, M. J.
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

McAdams, H. T.
FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

McCafferty, G. P.
UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT
HS-805 200

McDermott, Frank
COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

McHenry, Raymond R.
REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT
HS-805 209

McKann, Michael K.
LIGHT AND HEAVY TRUCKS LOSE WEIGHT, GAIN PAYLOAD
HS-026 788

McLean, Robert F.
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

Melvin, John W.
CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

Menga, P.
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

Mengert, Peter H.
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

Meyer, Heinrich
SELECTION AND CONDITIONS FOR THE APPLICATION OF TIRES FOR UTILITY VEHICLES (AUSWAHL UND EINSATZBEDINGUNGEN VON NUTZFAHRZEUGREIFEN)
HS-026 846

Miller, Carl E.
THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

Morris, John B.
SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

Nakamura, Kenya
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

Negri, D. Barry
ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 826

Neill, Art H. , Jr.
TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

Nerpel, Chuck
THE ELECTRICS ARE COMING
HS-026 832

Niedzielski, Rudi H.
MOBILE TELEPHONES: THE ULTIMATE AUTO ACCESSORY
HS-026 834

Obokata, T.
GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

Okano, Hiroshi
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

Oliver, David C.
TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

Olson, Paul L.
CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

Olson, R. M.
SAFETY AT NARROW BRIDGE SITES
HS-026 914

Overend, Robert B.
TRUCK ESCAPE RAMPS: EXITS TO SAFETY
HS-026 899

Paris, L.
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

Parker, Martin R. , Jr., comp.
VIRGINIA ESCORT DRIVER'S MANUAL
HS-026 907

Paulsen, Robert J.
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

Peck, Raymond C.
THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

Peters, Joesph F.
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

Picard, John
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Pirtle, R.
ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

Pong, Helen
EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

Post, David V.
CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

Ragunas, Anthony M.
SAFE TRANSPORT OF MUNITIONS
HS-026 936

Rask, Rodney B.
LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE
HS-026 859

Ratz, Michael
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

Reinfurt, Donald W.
THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

Rigby, Victor P.
POWER TAKE-OFFS FOR TRUCKS
HS-026 839

Robbins, D. H.
VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

Robbins, D. Hurley
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

Robinson, C. W.
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

Rood, Jeri
3-D. "DON' DRINK AN' DRINE"...UH, "DON' DRIKE AND' DIVE"...I MEAN... (DRIVING COURSE FOR DRUNK DRIVING OFFENDERS)
HS-026 909

Rorke, W. S.
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

Rosenthal, Murray
THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

Rudder, F. F. , Jr.
USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

Rudy, Burton M.
SAFE TRANSPORT OF MUNITIONS
HS-026 936

Rutenberg, Uwe
WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

Ryland, S. G.
THE EVIDENTIAL VALUE OF AUTOMOBILE PAINT CHIPS
HS-026 787

Sasaki, Tatsuro
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

Sato, Akira
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

Schroer, Bernard J.
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

Schroter, Hans Jurgen
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VER-

STARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

Schroter, Hans O.
MECHANICAL BOOSTERS FOR BRAKE AND CLUTCH ACTUATION (MECHANISCHE VERSTARKER ZUR BREMSEN- UND KUPPLUNGSBETATIGUNG)
HS-026 850

Schultz, Mort
FUEL FOR THE FUTURE. ANSWERS TO THE QUESTIONS ABOUT...CONVERTING YOUR CAR TO PROPANE
HS-026 829

HOW WE'LL RUN KILLER TRUCKS OFF THE ROADS
HS-026 830

Segel, L.
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

Seneczko, Myron
SELECTING TRANSMISSIONS FOR MOBILE EQUIPMENT
HS-026 814

Sforzini, M.
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

Sherman, Beverly
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

Shults, Steven D.
AGE AND BAC (BLOOD ALCOHOL CONCENTRATION) WHEN ARRESTED FOR DRUNKEN DRIVING AND PUBLIC DRUNKENNESS
HS-026 837

Shvartz, Esar
METABOLIC HEAT RETENTION AND THE VEHICLE OPERATOR
HS-026 961

Silvestro, F. B.
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

Simkins, M. L.
REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

Slomanson, William R.
EMERGENCE OF THE "TENDER YEARS" DOCTRINE: TOO YOUNG TO DRINK, BUT CAPABLE OF ESCAPING THE CIVIL CONSEQUENCES?
HS-026 827

Smith, J. R.
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

Soden, P. D.
FORCES APPLIED TO A BICYCLE DURING NORMAL CYCLING
HS-026 806

Staats, Elmer B.
PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

Stafford, Fred
LITTLE CARS: THEIR TIME HAS COME
HS-026 833

Stalnaker, Richard L.
CHILD AUTO RESTRAINT DESIGN PRINCIPLES
HS-026 888

Stamp, T. P.
REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

Stark, John A.
ELECTRICS INFILTRATE THE RANKS OF LIFT TRUCKS
HS-026 831

Starmer, G. A.
THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

Steinberger, R. L.
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

Stewart, Gerald
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

Stewart, J. Richard
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

Stewart, Michael L.
RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

Strang, Peter
COMPULSORY BLOOD ALCOHOL TESTING OF ROAD CRASH CASUALTIES IN VICTORIA [AUSTRALIA]: THE FIRST THREE YEARS
HS-026 890

Taylor, S. Martin
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

Taylor, Theodore , Jr.
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT
HS-804 463

Teo, R. K. C.
THE INTERACTION BETWEEN ETHANOL AND ANTIHISTAMINES. 1: DEXCHLORPHENIRAMINE
HS-026 838

Thomas, Larry W.
LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

Thompson, W. Fred
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA
HS-026 957

Tofany, Vincent L.
OPERATION LIFESAVER: A PROGRAM TO REDUCE ACCIDENTS AND DEATHS AT RAILROAD-HIGHWAY CROSSINGS
HS-026 886

Trewin, E. M.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Triggs, Thomas J.
EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

Trippett, Richard J.
AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

Turner, D. S.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Valenzuela, G.
WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

Vazey, B. A.
CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

Wagner, Donald R.
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

Wallace, Lance
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

Walton, N. E.
SAFETY AT NARROW BRIDGE SITES
HS-026 914

Weaver, G. D.
SAFETY AT NARROW BRIDGE SITES
HS-026 914

Wei, Y. K.
EFFECT OF LABILE CROSSLINKED SBR (STYRENE BUTADIENE RUBBER) ON PROPERTIES OF RADIAL TIRE COMPOUNDS
HS-026 900

Weinberg, Philip
CERAMICS IN ROLLING ELEMENT BEARINGS
HS-026 865

Wicken, G. W.
THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME
HS-026 897

Williamson, J. H.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Winkler, C.
GOVERNMENT EFFORTS TO REGULATE HEAVY TRUCK BRAKING. RESPONSE TO ADVANCE NOTICE OF PROPOSED RULEMAKING: AIR BRAKE SYSTEMS
HS-026 958

Wisdom, Philippa H.
EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

Witze, P. O.
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 85

Witzenburg, Gary
ON BECOMING GASOLHOLIC
HS-026 83

Wong, Terrence K. H.
SAFE TRANSPORT OF MUNITIONS
HS-026 936

Wormuth, Diana
SKANDIA REPORT 3. "UNPROTECTED ROAD USERS"
HS-026 821

Worthy, Ward
SYNFUELS: UNCERTAIN AND COSTLY FUEL OPTION
HS-026 885

Wright, J. Patrick
VENDOR QUALITY. THE HEAT IS ON [AUTO INDUSTRY]
HS-026 797

Wrigley, Al
COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

Yoshimura, H. Richard
CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

Young, John D.
WEIGHT REDUCTION FOR FUEL ECONOMY
HS-026 906

Young, Robert K.
RIDE QUALITY RATINGS AS A FUNCTION OF SENSORY INPUT
HS-026 545

Corporate Author Index

American Inst. of Graphic Arts, 1059 Third Ave., New York, N.Y. 10021
SYMBOL SIGNS 2: THE DEVELOPMENT OF PASSENGER/PEDESTRIAN ORIENTED SYMBOLS FOR USE IN TRANSPORTATION-RELATED FACILITIES. FINAL REPORT
HS-026 953

Applied Science Associates, Inc., Box 158, Valencia, Pa. 16059
REVISION OF NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) CURRICULUM PACKAGES. FINAL REPORT
HS-804 623

Approved Engineering Test Labs., P.O. Box 4158, Fullerton, Calif. 92631
WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1978 FORD LN600 FLAT BED TRUCK. FINAL REPORT
HS-804 860

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD TEST ON 1978 CHEVROLET G20 SPORTVAN. FINAL REPORT
HS-804 861

WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS TEST ON LIGHT DUTY TRUCKS. IDLE TEST VS ROAD LOAD TEST ON 1977 GMC SIERRA 15 PICKUP TRUCK. FINAL REPORT
HS-804 862

Budd Co., Technical Center, 375 Commerce Dr., Fort Washington, Pa. 19034
UNDERRIDE GUARD DESIGN FEASIBILITY STUDY. FINAL REPORT
HS-805 200

California State Business and Transportation Agency, Dept. of Motor Vehicles, Sacramento
THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION
HS-026 882

California State Business and Transportation Agency, Dept. of Motor Vehicles, Sacramento, Calif.
AN EVALUATION OF PROBATION-BY-MAIL AS AN ALTERNATIVE TO MANDATORY HEARING ATTENDANCE FOR NEGLIGENT OPERATORS
HS-026 951

Calspan Field Services, Inc., P.O. Box 400, Buffalo, N.Y. 14225
TRAINING PROGRAM FOR ACCIDENT INVESTIGATION AND CODING IN THE NATIONAL CRASH SEVERITY STUDY. FINAL REPORT
HS-805 202

REVISION OF THE CRASH2 COMPUTER PROGRAM. FINAL REPORT
HS-805 209

Canada Safety Council, 1765 St. Laurent Blvd., Ottawa, Ont., Canada K1G 3V4
ACCIDENT FATALITIES, CANADA 1976
HS-026 828

Canadian Trucking Assoc., 130 Albert St., Suite 300, Ottawa, Ont. K1P 5G4, Canada
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

Charles River Associates, 200 Clarendon St., Boston, Mass. 02116
CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES. FINAL REPORT
HS-804 776

Chilton Co., 201 King of Prussia Rd., Radnor, Pa. 19089
LIGHT DUTY TRUCK CHARACTERISTICS, HISTORICAL DATA BASE. FINAL REPORT
HS-804 787

City of Arlington, Tex., Dept. of Traffic and Transportation, Arlington, Tex.
MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 2: PRODUCT SCHEDULES OF ENGINE/DRIVETRAIN COMBINATIONS. FINAL REPORT
HS-804 461

Corporate-Tech Planning, Inc., 275 Wyman St., Waltham, Mass. 02154
AUTOMOTIVE MANUFACTURING ASSESSMENT SYSTEM. VOL. 4: ENGINE MANUFACTURING ANALYSIS. FINAL REPORT
HS-804 463

Davis, Eryou and Associates Ltd.
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

Department of Industry, Vehicles Div., United Kingdom
THE LONDON ELECTRIC DELIVERY VAN ASSESSMENT SCHEME
HS-026 897

Department of Transportation, Office of Public and Consumer Affairs, Washington, D.C. 20590
SEARCHLIGHT ON SAFETY [MOTORCYCLE HELMET USE]
HS-026 825

Department of Transportation, Office of Transportation Security, Washington, D.C. 20591
CARGO SECURITY LITERATURE SURVEY
HS-026 954

Department of Transportation, Washington, D.C. 20590
FUTURE AUTOMOTIVE TECHNOLOGY. A RESEARCH BLUEPRINT
HS-026 847

Douglas Ball Inc., 88, rue Sainte-Anne, Sainte-Anne-de-Bellevue, Que. H9X 1L8, Canada
WHEELCHAIR TIE-DOWN/PASSENGER SEAT PROTOTYPE DEVELOPMENT (FOR RAIL PASSENGERS)
HS-026 926

Dynamic Science Inc., Talley Industries Co., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
REPEATABILITY OF VISIBILITY TESTS. FINAL REPORT
HS-805 201

Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
ACCIDENT INVESTIGATION STUDIES. STAGED REAR IMPACT COLLISIONS. FINAL REPORT
HS-805 197

Ecology and Environment Inc., Buffalo, N.Y.
COMPUTER MODEL FOR LIQUEFIED NATURAL GAS AND LIQUEFIED PROPANE GAS RISK SIMULATION
HS-026 934

Electric Power Res. Inst.
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

Environmental Protection Agency, Washington, D.C.
USE OF PERSONAL MONITOR TO MEASURE COMMUTER EXPOSURE TO CARBON MONOXIDE IN VEHICLE PASSENGER COMPARTMENTS
HS-026 946

ENSCO, Inc., 5408A Port Royal Rd., Springfield, Va. 22151
TRUCK TIRE CORNERING AND BRAKING TRACTION STUDY. FINAL REPORT
HS-804 732

Falcon Res. and Devel., 1 American Drive, Buffalo, N.Y. 14225
FUEL ECONOMY OF AUTOMOTIVE VEHICLES, A COMPENDIUM OF STATISTICAL TECHNIQUES
HS-026 841

Federal Hwy. Administration, Office of Res., Washington, D.C. 20590
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

Federal Hwy. Administration, Washington, D.C. 20590
TORT LIABILITY: SPECIAL PROBLEMS ENCOUNTERED BY HIGHWAY AGENCIES AND CONTRACTORS IN DESIGNING WORK ZONE LAYOUTS
HS-026 937

WORK ZONE SAFETY (ROADWAY CONSTRUCTION AND MAINTENANCE SITES)
HS-026 928

Florida State Dept. of Hwy. Safety and Motor Vehicles, Bureau of Records and Training
1978 TRAFFIC ACCIDENT FACTS: AN ILLUSTRATED ANALYSIS OF ACCIDENT RECORDS [FLORIDA]
HS-026 892

Ford Motor Co., Automotive Safety Office, P.O. Box 2053, Dearborn, Mich. 48121
SAFETY SYSTEMS OPTIMIZATION MODEL (SSOM). VOL. 1: INTRODUCTION AND EXECUTIVE SUMMARY. FINAL REPORT
HS-804 771

General Accounting Office, Washington, D.C. 20548
PASSIVE RESTRAINTS FOR AUTOMOBILE OCCUPANTS--A CLOSER LOOK. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-026 955

General Motors Corp., AC Spark Plug Div.
THE PARAMETERS THAT CONTROL THE PERFORMANCE OF THE IN-TANK FUEL STRAINER
HS-026 856

General Motors Corp., Warren, Mich.
RISK ANALYSIS IN MAINTAINABLE DESIGNS
HS-026 952

General Motors Res. Labs.
USING MICROWAVES TO PHASE CYLINDER PRESSURE TO CRANKSHAFT POSITION
HS-026 862

General Motors Res. Labs., Fluid Dynamics Res. Dept., Warren, Mich.
LASER DOPPLER ANEMOMETER MEASUREMENTS IN AN INTERNAL COMBUSTION ENGINE
HS-026 859

General Motors Res. Labs., Power Systems Dept., Warren, Mich.
AIR BEARING DEVELOPMENT FOR A GM (GENERAL MOTORS) AUTOMOTIVE GAS TURBINE
HS-026 864

General Services Administration, Federal Fleet Management Div. (TMM), Washington, D.C. 20406
FEDERAL MOTOR VEHICLE FLEET REPORT FOR FISCAL YEAR 1978 (OCTOBER 1, 1977-SEPTEMBER 30, 1978)
HS-026 908

Gunma Univ., Dept. of Mechanical Engineering
GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

Hercules Inc., Allegany Ballistics Lab., Cumberland, Md.
RISK ANALYSIS OF AN AUTOMATED ASSEMBLY LINE OPERATION
HS-026 939

Highway Loss Data Inst., Watergate 600, Washington, D.C. 20037
AUTOMOBILE INSURANCE LOSSES, COLLISION COVERAGES; INITIAL RESULTS FOR 1979 MODELS
HS-026 799

AUTOMOBILE INSURANCE LOSSES, INJURY COVERAGES; COMPARISONS OF CLAIM FREQUENCIES OF VOLKSWAGEN RABBITS WITH AUTOMATIC AND MANUAL SEAT BELTS, 1975, 1976, AND 1977 MODELS
HS-026 800

AUTOMOBILE INSURANCE LOSS, COLLISION COVERAGES; THE CONSISTENCY OF THE LOSS EXPERI-

ENCE OF SPECIFIC VEHICLES PRODUCED IN SEVERAL YEARS, 1975 TO 1978 MODELS
HS-026 801

Howard Needles Tammen and Bergendoff, Kansas City, Mo.
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

Howard Needles Tammen and Bergendoff, Kansas City, Mo.
STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

Institute of Transportation Engineers, (Michigan Section, District 3) Traffic Engineering Around Schools Com.
TRAFFIC SAFETY PLANNING ON SCHOOL SITES
HS-026 854

Italian Electricity Board
ENEL (ITALIAN ELECTRICITY BOARD) EXPERIENCE AND DEMONSTRATION PROGRAMS IN THE FIELD OF ELECTRIC VEHICLES
HS-026 896

John Z. DeLorean Corp., P.O. Box 427, Bloomfield Hills, Mich. 48013
DEVELOPMENT OF A MOTOR VEHICLE MATERIALS HISTORICAL, HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK (LIGHT TRUCK). FINAL REPORT
HS-805 161

Lawrence Inst. of Tech., Southfield, Mich.
RISK ANALYSIS IN MAINTAINABLE DESIGNS
HS-026 952

Massachusetts Inst. of Tech., Dept. of Mechanical Engineering
FLOW VISUALIZATION STUDY OF THE INTAKE PROCESS OF AN INTERNAL COMBUSTION ENGINE
HS-026 860

McMaster Univ., Hamilton, Ont., Canada
EFFECTIVENESS OF SHIELDING IN REDUCING ADVERSE IMPACTS OF HIGHWAY TRAFFIC NOISE
HS-026 810

EFFECTS OF HIGHWAY NOISE ON RESIDENTIAL PROPERTY VALUES
HS-026 811

REGULATORY IMPLICATIONS OF INDIVIDUAL REACTIONS TO ROAD TRAFFIC NOISE
HS-026 809

Mechanical Technology Inc.
FOIL TYPE BEARINGS FOR THE CHRYSLER AUTOMOTIVE GAS TURBINE ENGINE PROGRAM--DEVELOPMENT AND OPERATIONAL EXPERIENCES
HS-026 866

Metropolitan Police Dept., Traffic and Special Operations Div., 501 New York Ave., N.W., Washington, D.C. 20037
A SURVEY OF PERSONS ARRESTED FOR DRIVING UNDER THE INFLUENCE IN THE DISTRICT OF COLUMBIA
HS-026 957

Midwest Res. Inst., Kansas City, Mo.
STATUS OF TRAFFIC SAFETY IN HIGHWAY CONSTRUCTION ZONES
HS-026 930

Midwest Res. Inst., Kansas City, Mo.
ACCIDENT ANALYSES OF HIGHWAY CONSTRUCTION ZONES
HS-026 933

Monash Univ., Human Factors Group, Clayton, Vic. 3168, Australia
EFFECTS OF PAVEMENT DELINEATION MARKING ON VEHICLE LATERAL POSITION-KEEPING
HS-026 798

National Com. on Uniform Traffic Laws and Ordinances, Suite 430, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036
DRIVERS LICENSE SUSPENSIONS FOR FAILURE TO APPEAR IN COURT
HS-805 118

National Hwy. Traffic Safety Administration, (Washington, D.C. 20590)
AUTO CRASHES: THE REPERCUSSIONS FOR THE AMERICAN FAMILY
HS-805 218

National Hwy. Traffic Safety Administration, Office of Automotive Fuel Economy Standards, 400 7th St., S.W., Washington, D.C. 20590
REPORT ON REQUESTS BY GENERAL MOTORS AND FORD TO REDUCE FUEL ECONOMY STANDARDS FOR MY (MODEL YEAR) 1981-85 PASSENGER AUTOMOBILES. FINAL REPORT
HS-804 731

National Hwy. Traffic Safety Administration, Office of Passenger Vehicle Res., 400 7th St., S.W., Washington, D.C. 20590
SEAT BELT PERFORMANCE OF MANUAL AND AUTOMATIC SYSTEMS INSTALLED IN THE GM CHEVROLET CHEVETTE AND THE VW RABBIT
HS-805 203

National Hwy. Traffic Safety Administration, Office of State Program Assistance, 400 Seventh St., S.W., Washington, D.C. 20590
STATE MOTORCYCLE SAFETY ACTIVITIES
HS-804 883

National Hwy. Traffic Safety Administration, Office of Vehicle Safety Standards, Washington, D.C. 20590
THE CAMPAIGN FOR TRAFFIC SAFETY IN PORTUGAL (CAMPANHA DE SEGURANCA RODOVIARIA). FINAL REPORT
HS-804 830

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 826

INVOLVEMENT OF SUSPENDED/REVOKED DRIVERS IN TRAFFIC CRASHES: A STATEMENT OF THE PROBLEM. GUIDELINES FOR MOTOR VEHICLE ADMINISTRATORS
HS-804 104

SAFETY RELATED RECALL CAMPAIGNS FOR MOTOR VEHICLES AND MOTOR VEHICLE EQUIP-

MENT, INCLUDING TIRES, JULY 1, 1979 TO SEPTEMBER 30, 1979, REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS
HS-805 195

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. COURSE GUIDE
HS-900 025

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. INSTRUCTOR'S LESSON PLANS
HS-900 026

EMERGENCY MEDICAL SERVICES: FIRST RESPONDER TRAINING COURSE. STUDENT STUDY GUIDE
HS-900 027

National Transportation Safety Board, Bureau of Technology, Washington, D.C. 20594
NONCOMPLIANCE WITH HAZARDOUS MATERIALS SAFETY REGULATIONS. SPECIAL STUDY
HS-026 959

National Transportation Safety Board, Office of Evaluations and Safety Objectives, Washington, D.C. 20594
SAFETY EFFECTIVENESS EVALUATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RULEMAKING PROCESS. VOL. 1 -- CASE HISTORY OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 121: AIR BRAKE SYSTEMS
HS-026 950

Naval Air Systems Command, Washington, D.C.
CERAMICS IN ROLLING ELEMENT BEARINGS
HS-026 865

New York State Dept. of Motor Vehicles, Div. of Res.
ACCIDENTS INVOLVING HANDICAPPED DRIVERS
HS-026 826

NACHI-Fujikoshi Corp.
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

Ontario Ministry of Transportation and Communications, Comercial Vehicle Operations and Safety, Ont., Canada
TEST OF SELF-STEERING TRAILER AXLES
HS-026 812

Oregon State Dept. of Transportation, State Hwy. Div., State Hwy. Bldg., Salem, Oreg. 97310
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. FINAL REPORT
HS-026 956

Postal Service, Res. and Devel. Labs.
COLD TEMPERATURE TESTS OF HEATED/INSULATED BATTERY FOR AM (AMERICAN MOTORS) GENERAL DJ-5E JEEPS
HS-026 938

Princeton Univ., Dept. of Mechanical and Aerospace Engineering
A PULSED-ILLUMINATION, CLOSED-CIRCUIT TELEVISION SYSTEM FOR REAL-TIME VIEWING OF ENGINE COMBUSTION AND OBSERVED CYCLIC VARIATIONS
HS-026 858

Regents of the Univ. of Michigan, Ann Arbor, Mich. 48109
THE ROLLING RESISTANCE OF PNEUMATIC TIRES. FINAL REPORT
HS-804 523

Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142
EFFECTIVENESS OF SPEED CONTROL SIGNS IN RURAL SCHOOL ZONES AND SMALL COMMUNITIES. FINAL REPORT
HS-026 881

Road Safety and Traffic Authority, Vic., Australia
THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA [AUSTRALIA]. TECHNICAL REPORT
HS-026 891

Sandia Labs., Albuquerque, N. Mex.
CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS
HS-026 935

Sandia Labs., Livermore, Calif.
APPLICATION OF LASER DIAGNOSTICS TO AN INJECTED ENGINE
HS-026 857

Science Applications, Inc., Energy and Environmental Sciences Div., 1651 Old Meadow Rd., McLean, Va. 22102
USER'S MANUAL: FHWA (FEDERAL HIGHWAY ADMINISTRATION) LEVEL 2 HIGHWAY TRAFFIC NOISE PREDICTION MODEL, STAMINA 1.0. FINAL REPORT
HS-026 913

Southern Calif. Edison Co.
EPRI/TVA (ELECTRIC POWER RESEARCH INSTITUTE/TENNESSEE VALLEY AUTHORITY) PILOT ELECTRIC VEHICLE DEMONSTRATION PROGRAM
HS-026 855

Southwest Res. Inst., San Antonio, Tex.
CRASH TEST EVALUATION OF TEMPORARY TRAFFIC BARRIERS
HS-026 931

MOBILE ORBIS III SPEED ENFORCEMENT DEMONSTRATION PROJECT IN ARLINGTON, TEXAS: PROGRAM EVALUATION. FINAL REPORT
HS-804 835

System Devel. Corp., 2500 Colorado Ave., Santa Monica, Calif. 90406
THE ROLE OF THE CITIZENS BAND RADIO SERVICE AND TRAVELERS INFORMATION STATIONS IN CIVIL PREPAREDNESS EMERGENCIES. FINAL REPORT
HS-026 848

Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
SAFETY AT NARROW BRIDGE SITES
HS-026 914

Tokai Univ., Dept. of Mechanical Engineering
GAS VELOCITY MEASUREMENTS OF A MOTORED AND FIRING ENGINE BY LASER ANEMOMETRY
HS-026 861

Toyota Motor Co., Ltd.
A DEVELOPMENT OF THE TRACTION ROLLER SYSTEM FOR A GAS TURBINE DRIVEN APU (AUXILIARY POWER UNIT)
HS-026 863

Traffic Accident Res. Unit, Dept. of Motor Transport, New South Wales, Australia
CRASH PROTECTION FOR CHILDREN AFTER THEIR THIRD BIRTHDAY
HS-026 894

CHILD RESTRAINT FIELD STUDY (PROJECT REPORT ON "IMPACT-3")
HS-026 895

Transport and Road Res. Lab., Accident Investigation Div., Crowthorne, Berks., England
THE PROTECTION AFFORDED BY SEAT BELTS
HS-026 844

Transport Canada, Strategic Studies Branch
SAVING FUEL WITH TRUCK DRAG-REDUCTION DEVICES (ECONOMIES DE COMBUSTIBLE AVEC DES ACCESSOIRES AERODYNAMIQUES POUR CAMIONS)
HS-026 893

Transportation Engineering Agency, Military Traffic Management Command
SAFE TRANSPORT OF MUNITIONS
HS-026 936

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
EFFECTS OF TRANSPORTATION ON THE COMMUNITY
HS-026 808

SAFETY IN CONSTRUCTION AND MAINTENANCE WORK ZONES AND TRANSPORTATION OF HAZARDOUS MATERIALS
HS-026 927

LIABILITY FOR IMPROPER TRAFFIC SIGNALING, SIGNING, AND PAVEMENT MARKINGS. ABRIDGMENT
HS-026 929

Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
ASSESSMENT OF CURRENT U.S. DEPARTMENT OF TRANSPORTATION FIRE SAFETY EFFORTS. FINAL REPORT
HS-026 880

University of Alabama, Kenneth E. Johnson Environmental and Energy Center, P.O. Box 1247, Huntsville, Ala. 35807
SELECTIVE SURVEY OF THE CAPABILITY OF REPRESENTATIVE AUTOMOBILE REPAIR FACILITIES TO DIAGNOSE AND REPAIR AUTOMOBILES. FINAL REPORT
HS-804 839

University of California, Berkeley, Calif.
REGULATORY IMPLICATIONS OF INDIVIDUAL R-ACTIONS TO ROAD TRAFFIC NOISE
HS-026 80

University of Melbourne, Dept. of Mechanical Engineering, Vic., Australia
ROAD CURVE GEOMETRY AND DRIVER BEHAVIOUR
HS-026 889

University of Mich., Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 1. FINAL REPORT
HS-026 941

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 2. FINAL REPORT
HS-026 942

University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
CONSIDERATIONS FOR REARVIEW MIRROR SYSTEMS FOR LARGE TRUCKS
HS-026 786

University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4. VOL. 3. FINAL REPORT
HS-026 943

VALIDATION COMMAND LANGUAGE (1979 VERSION). FINAL REPORT
HS-026 944

SURVEY OF ANTILOCK SYSTEM PROPERTIES: MOTOR TRUCK BRAKING AND HANDLING PERFORMANCE STUDY. FINAL TECHNICAL REPORT
HS-026 945

University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
THE EFFECT OF USING A "TOWAWAY" THRESHOLD IN STUDYING TRAFFIC ACCIDENTS. FINAL REPORT
HS-805 210

University of North Carolina, Hwy. Safety Res. Center, South Campus, CPT 197A, Chapel Hill, N.C. 27514
TECHNIQUES FOR PREDICTING HIGH-RISK DRIVERS FOR ALCOHOL COUNTERMEASURES. VOL. 1: TECHNICAL REPORT. FINAL REPORT
HS-804 851

University of Wisconsin-Madison, Statistical Lab., 1210 West Dayton St., Madison, Wis. 53706
EVALUATION OF THE WISCONSIN DRIVER IMPROVEMENT PROGRAM. EXECUTIVE SUMMARY
HS-026 922

Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
VIRGINIA ESCORT DRIVER'S MANUAL
HS-026 907

EVALUATION OF TIMBER BARRICADES AND PRECAST CONCRETE TRAFFIC BARRIERS FOR USE IN HIGHWAY CONSTRUCTION AREAS
HS-026 932

Ward's Auto World v15 n7 p79-81 (Jul 1979)
COMING: LIGHTER COMPONENTS [AUTOMOBILE CASTINGS AND FORGINGS]
HS-026 796

Wyoming Hwy. Dept., Safety Improvement Section, P.O.
Box 1708, Cheyenne, Wyo. 82001
WYOMING TRAFFIC ACCIDENT FACTS 1978
HS-026 813

Contract Number Index

DCPA01-76-C-0330
System Devel. Corp., 2500 Colorado Ave., Santa Monica, Calif. 90406
HS-026 848

DOE-EC-77-S-02-4191
Princeton Univ., Dept. of Mechanical and Aerospace Engineering
HS-026 858

DOE-P-14-77-6037-0
Falcon Res. and Devel., 1 American Drive, Buffalo, N.Y. 14225
HS-026 841

DOT-FH-11-7950
Oregon State Dept. of Transportation, State Hwy. Div., State Hwy. Bldg., Salem, Oreg. 97310
HS-026 956

DOT-FH-11-9384
Science Applications, Inc., Energy and Environmental Sciences Div., 1651 Old Meadow Rd., McLean, Va. 22102
HS-026 913

DOT-HS-346-3-692
City of Arlington, Tex., Dept. of Traffic and Transportation, Arlington, Tex.; Southwest Res. Inst., San Antonio, Tex.
HS-804 835

DOT-HS-4-00897
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
HS-805 210

DOT-HS-4-00936-5
New York State Dept. of Motor Vehicles, Div. of Res.; National Hwy. Traffic Safety Administration, Washington, D.C. 20590
HS-026 826

DOT-HS-5-01121
National Com. on Uniform Traffic Laws and Ordinances, Suite 430, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036
HS-805 118

DOT-HS-5-01250
University of North Carolina, Hwy. Safety Res. Center, South Campus, CPT 197A, Chapel Hill, N.C. 27514
HS-804 851

DOT-HS-6-01376
Applied Science Associates, Inc., Box 158, Valencia, Pa. 16059
HS-804 623

DOT-HS-6-01442
Calspan Field Services, Inc., P.O. Box 400, Buffalo, N.Y. 14225
HS-805 202

Calspan Field Services, Inc., P.O. Box 400, Buffalo, N.Y. 14225
HS-805 209

DOT-HS-6-01446
Ford Motor Co., Automotive Safety Office, P.O. Box 2053, Dearborn, Mich. 48121
HS-804 771

DOT-HS-6-01489
University of Wisconsin-Madison, Statistical Lab., 1210 West Dayton St., Madison, Wis. 53706
HS-026 922

DOT-HS-7-01770
John Z. DeLorean Corp., P.O. Box 427, Bloomfield Hills, Mich. 48013
HS-805 161

DOT-HS-7-01779
Charles River Associates, 200 Clarendon St., Boston, Mass. 02116
HS-804 776

DOT-HS-7-01816
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HS-804 860

Approved Engineering Test Labs., P.O. Box 4158, Fullerton, Calif. 92631
HS-804 861

Approved Engineering Test Labs., P.O. Box 4158, Fullerton, Calif. 92631
HS-804 862

DOT-HS-8-01967
Dynamic Science Inc., Talley Industries Co., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
HS-805 201

DOT-HS-9-02289
Budd Co., Technical Center, 375 Commerce Dr., Fort Washington, Pa. 19034
HS-805 200

DOT-OS-60510
American Inst. of Graphic Arts, 1059 Third Ave., New York, N.Y. 10021
HS-026 953

DOT-OS-90004
University of Alabama, Kenneth E. Johnson Environmental and Energy Center, P.O. Box 1247, Huntsville, Ala. 35807
HS-804 839

DOT-TSC-1031
Regents of the Univ. of Michigan, Ann Arbor, Mich. 48109
HS-804 523

DOT-TSC-1338
Chilton Co., 201 King of Prussia Rd., Radnor, Pa. 19089
HS-804 787

DOT/TSC-1383
Corporate-Tech Planning Inc., 275 Wyman St., Waltham, Mass. 02154
HS-804 461

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HS-804 463

NHTSA-8-0323
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
HS-805 197

NHTSA-9-6227
ENSCO, Inc., 5408A Port Royal Rd., Springfield, Va. 22151
HS-804 732

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Princeton Univ., Dept. of Mechanical and Aerospace Engineering

HS-026 858

Ref: DOT-HS-8-01886

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HS-805 197

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HS-026 926

095DT8200-7-7523

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HS-026 926

Report Number Index

AARB-SR-15 HS-026 889
AETL-771-2487-1 HS-804 860
AETL-771-2487-2 HS-804 861
AETL-771-2487-3 HS-804 862
CAL-DMV-RSS-79-69 HS-026 882
CAL-DMV-RSS-79-70 HS-026 951
CED-79-93 HS-026 955
CVOS-TR-79-02 HS-026 812
DOT-RSPA-DPB-40-79-2 HS-026 953
DOT-TSC-FHWA-79-1 HS-026 881
DOT-TSC-NHTSA-79-28 HS-804 523
DOT-TSC-NHTSA-79-29.II HS-804 461
DOT-TSC-NHTSA-79-29.IV HS-804 463
DOT-TSC-NHTSA-79-37 HS-804 787
DOT-TSC-UMTA-78-47 HS-026 880
ENSCO-1306 HS-804 732
EPA-79-59.2 HS-026 946
FHWA-RD-78-138 HS-026 913
FHWA-RD-78-32 HS-026 956
FHWA-RD-79-20 HS-026 881
HCP/M6037-01 HS-026 841
HFR-10 HS-026 798
HLDI-A-10 HS-026 800
HLDI-A-11 HS-026 801
HLDI-R79-1 HS-026 799
IMechE-C343 HS-026 807
NCHRP-203 HS-026 914
NTSB-HZM-79-2 HS-026 959
NTSB-SEE-79-4 HS-026 950
SAE-790091 HS-026 856
SAE-790092 HS-026 857
SAE-790093 HS-026 858
SAE-790094 HS-026 859
SAE-790095 HS-026 860
SAE-790096 HS-026 861
SAE-790103 HS-026 862
SAE-790106 HS-026 863
SAE-790107 HS-026 864
SAE-790108 HS-026 865
SAE-790109 HS-026 866
SAE-790110 HS-026 855
SAE-790111 HS-026 897
SAE-790113 HS-026 896
SAE-790115 HS-026 938
SAE-790283 HS-026 939
SAE-790284 HS-026 952
SAE-790289 HS-026 961
SL-79/1 HS-026 922

TCR-0584-1	HS-805 200
TM-5752/002/01	HS-026 848
TP-1821	HS-026 926
TRR-686	HS-026 808
TRR-693	HS-026 927
TRRL-SR-449	HS-026 844
UAH-220	HS-804 839
UM-HSRI-78-47	HS-026 945
UM-HSRI-79-17	HS-026 786
UM-HSRI-79-5-1	HS-026 941
UM-HSRI-79-5-2	HS-026 942
UM-HSRI-79-5-3	HS-026 943
UM-HSRI-79-6	HS-026 944
UMTA-MA-06-0051-79-4	HS-026 880
ZP-6003-V-1	HS-805 209
ZP-6003-V-3	HS-805 202
2/78	HS-026 894
3010-78-47	HS-805 197
3044-79-178	HS-805 201
5-451-00-066-06	HS-026 913
7/77	HS-026 895

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See publication: Articles in journals, papers in proceedings, or chapters in books are found in the publication cited. These publications may be in libraries or purchased from publishers or dealers.

SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Corporate author: Inquiries should be addressed to the organization listed in the individual citation.

ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-026 115

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)

The first section lists Spanish terms followed by their English counterparts; the second lists the English terms first. Both lists are arranged alphabetically. Indication is made of those English entries which translate Spanish verbs or phrases containing verbs, those containing language that applies only to Great Britain, and those with language applying only to the U.S. No attempt has been made in this edition to point out the substantial differences in automotive terminology which exist among the Spanish-speaking countries.

Chrysler Corp., Technical Information Dept.
Rept. No. SAE-SP-436 ; 1978 ; 389p
Text in English and Spanish.
Availability: SAE

HS-026 962

1978 NORTH DAKOTA VEHICULAR ACCIDENT FACTS

Statistical information is tabulated for 1978 vehicular accidents for all highway systems within North Dakota: driver characteristics, cost, fatalities, injuries, age and sex of those involved, violations/convictions, alcohol involvement, locale, vehicle type, environmental and road conditions, time of day and month, accident type, contributing factors, vehicle defects, and nontraffic accidents. A map of the state showing the fatality rate for each county is included. In 1978, there were 18,037 traffic accidents in the state (vs. 17,577 in 1977). There were 185 fatalities (vs. 180 in 1977) and 6206 persons injured (vs. 6346). Forty-two percent of the fatal accidents occurred after dusk and before dawn; 64% occurred on dry surface with clear weather conditions. Of the licensed drivers in North Dakota, 7.3% were involved in a traffic accident. The fatality rate (deaths per 100 million vehicle miles traveled) was 3.50, compared to the national rate of 3.27.

North Dakota State Hwy. Dept., Transportation Services Div.,
Capitol Grounds, Bismarck, N. Dak. 58505
1979 ; 28p
Availability: Corporate author

HS-026 963

ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES

An adhesive bonding study was conducted to generate data required for the full utilization of graphite and continuous glass reinforced plastics in lightweight vehicle production. A wide range of acrylic, epoxy, and urethane adhesives was screened on the basis of strength comparisons of adhesive-bonded samples at elevated temperatures and under different surface treatments, cure cycle, and bond thickness conditions. Three adhesives were selected for further evaluation: EA 934, epoxy; PG 6040/6045, urethane, and Li 59/260, acrylic. All three adhesives showed a small decrease in lap shear strength at bond thicknesses up to 1 mm. The acrylic and urethane adhesives showed maximum bond strength on a primed surface which had not been scuff-sanded. The epoxy adhesive, which required either scuff sanding or flame treatment to prepare the surface for good bonding, retained more than 90% of its room temperature properties at 93 degrees C; the other two adhesives had a 60% strength retention at this temperature. All three adhesives could be cured at room temperature. At room temperature and at 0.50 mm bond lines, all three adhesives produced bonded structures with Joint Stiffness Efficiency (ratio of measured flexural modulus of two 1-in wide laminates bonded together with the adhesive, to the flexural modulus of the base laminate) greater than 75%. In environmental studies, the lap shear strength of all three adhesives was minimally affected by soaking in distilled water at 82 degrees C for 14 days. The bond stiffness efficiency of the urethane joint dropped sharply, indicating substantial plasticization of the adhesive. The epoxy adhesive was the only one unaffected by aging 14 days at 149 degrees C.

by Probir K. Guha; Joseph N. Epel
Budd Co., Plastic Res. and Devel. Center, Troy, Mich.
Rept. No. SAE-790149 ; 1979 ; 10p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Sponsored in part by Ford Motor Co.
Availability: SAE

HS-026 964

MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES

A research-test film and questionnaire were used to measure motorist understanding of certain traffic control devices (TCD's) in actual driving situations. Over 3000 drivers from across the U.S. participated in the program which tested the comprehensibility of 23 different scenes of 16 TCD's (signs, markings, and signals). Driver understanding of traffic controls was found to range from only 18% on one control to a high of 97% on another. No control device was understood by all drivers. Even the best understood signs were not well understood by 5% to 10% of the drivers. Drivers understood symbol signs better than either signals or pavement markings. The differences in the important symbols for SCHOOL ZONE and SCHOOL CROSSING were misunderstood by a significant proportion of drivers. The fairly recent nationwide usage of a solid, single, yellow pavement roadway marking has caused a high level of misunderstanding. Only three out of ten drivers understood that on a two-way, rural roadway, passing is allowed on the single, solid yellow line; most drivers thought the solid yellow line meant "no passing permitted". Another significant finding is that motorists do not fully understand and recognize the significance of "orange" background signs indicating highway construction zones. Older drivers (over 49) showed generally less accurate comprehension of the traffic controls; drivers aged 24-29 had the best understanding; younger drivers (under 24) had a slightly better comprehension than older drivers. There were no strong overall trends in comprehension differences between males and females.

by Slade Hulbert; Jinx Beers; Paul Fowler
Automobile Club of Southern California
1979 ; 58p
Sponsored by AAA Foundation for Traffic Safety.
Availability: AAA Foundation for Traffic Safety, 8111 Gatehouse Rd., Falls Church, Va. 22042

HS-026 965

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE

As an initial step in a systematic investigation of design parameters of the Ford PROCO (Programmed Combustion) engine affecting in-cylinder fluid motion, fuel/air mixing, combustion, and heat transfer, bulk cylinder flow as influenced by design and operating variables was studied in a PROCO Flow Simulation (PFSIM) model. The model was developed to calculate the angular velocity (swirl) and radial velocity (squish) as a function of crank angle for the four strokes of the motored engine cycle. The PFSIM model also calculates the time dependent cylinder pressure, temperature and mass, and accepts the following swirl-related parameters as input: dimensionless angular momentum and mass flow coefficients for a specific intake and exhaust system configuration. These parameters determine the intake-generated swirl which is computed from the angular momentum flux entering the cylinder during the induction process. An angular momentum flux swirl meter was used to obtain the required input data for three different intake port configurations, and calculations of the bulk cylinder flow were carried out with PFSIM for each intake port configuration. Experimental measurements of in-cylinder swirl were obtained with the spark discharge/time-of-flight method in a motored PROCO research engine for the same three intake ports. Good agreement was found between measured and calculated swirl velocities. The importance of angular momentum dissipation within the cylinder is indicated by the results of this investigation. In further model calculations, the sensitivity of swirl and squish to changes in piston geometry has been shown.

by G. C. Davis; J. C. Kent
Ford Motor Co.
Rept. No. SAE-790290 ; 1979 ; 35p 39refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 966

ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5

In a report on methods and results of the Queensland (Australia) Vehicle-Mile Performance Survey, the relationship of driver sex to accident involvement is analyzed, using statistical data on motor vehicle accidents in the state. One important finding is that, on the whole, women appear to be less accident involved, having less than 80% the involvement rate of men. However, a female is not necessarily a better driver. Considering the significant differences in the frequency distribution of the various types of vehicles used, trip types, and time and spatial variations and driving conditions, all of which place the male driver at a disadvantage, there is no uniform basis upon which a valid driving comparison between the sexes can be made. It was found, as expected, that there is a higher accident involvement rate (per miles traveled) among both male and female youth. The female involvement rate curve is, up to the age of 40, very similar to, and practically parallel with the male curve, but at a lower level. From age 40 on, it starts to rise; somewhere in the mid-forties it crosses the male curve and remains above it. No known earlier studies have observed this higher accident involvement for females of all age groups after 40, culminating in the 50-59 age group. Every subdivision of female drivers by any other variable was found to exhibit this trait. Other comparisons between male and female drivers concern accident severity, accident type, vehicle type, area of occurrence, day of week, hour of day, number of occupants, and car design characteristics. The age-specific involvement rates of the two sexes are compared with respect to factors including accident locale (metropolitan, provincial urban, or rural), and type and severity of accidents.

by L. A. Foldvary
Publ: Accident Analysis and Prevention v11 n2 p75-99 (Jun 1979)
1979 ; 6refs
Pt. 1 is HS-017 331; pt. 2 is HS-019 013; pt. 3 is HS-020 570.
Availability: See publication

HS-026 967

THE USE OF MULTIPLICATIVE MODELS FOR ANALYSIS OF ROAD SAFETY DATA

Accident ratios are analyzed with regard to two variables: road-surface skidding resistance and hourly traffic volume. In a first analysis, the Additive Conjoint Measurement model is used to investigate to what extent the accident ratios can be described as a result of independent contributions of skidding resistance and traffic volume. It is further considered whether these contributions have to be combined in an additive or multiplicative way. Based on the results of this investigation, a second analysis combines stochastic interpretation of the data with the multiplicative model. This Weighted Poisson model is a generalization of the log-linear model, recently proposed for the analysis of contingency tables. It is concluded that the multiplicative model describes the data better than the additive model, and that there is no interaction between skidding resistance and traffic volume in their effect on accident ratios. The relation between accident ratios and both variables are shown, and the statistics regarding the contributions of the variables are given.

by S. Oppe
Publ: Accident Analysis and Prevention v11 n2 p101-15 (Jun 1979)
1979 ; 10refs
Availability: See publication

HS-026 968

INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES

An epidemiological questionnaire study was conducted concerning alcohol, drugs, and driving in Finland. Four issues were of interest: prevalence of persons holding a valid driver's license among customers of pharmacies; prevalence of drug utilization (drugs having the potential to impair driving skills); patterns of alcohol use; and relative number of accidents encountered by drivers purchasing drugs in pharmacies. Drivers were classified according to alcohol and drug use and living district. Pharmacists recorded prescription and over-the-counter drugs bought by their customers; 100 consecutive customers who bought oral prescription drugs in pharmacies were asked if they had a driver's license and whether their physician had told them about the effects of drugs on driving skills. Information was obtained by interviewing 984 customers concerning the possession of a driver's license, drug use, alcohol consumption, and whether their physician had told them about the mechanism of action and side effects of drugs. Results showed that about 60% of customers having a driver's license purchased drugs which may have deleterious effects on driving skills. Only 20% of these subjects had received information concerning drugs and driving from their physicians. In urban areas, alcohol and drug users had 1.5-2.5 times increased traffic accident involvement compared with nonusers. Nearly all pharmacy customers used drugs they bought by themselves. The need to inform the public about the effects of drugs on daily activities, road traffic accidents, and occupational hazards is emphasized.

by M. Maki; M. Linnoila; J. Idanpaan-Heikkila; J. Isomeri
Publ: Accident Analysis and Prevention v11 n2 p117-24 (Jun 1979)
1979 ; 12refs
Sponsored by the Ministry of Communications.
Availability: See publication

HS-026 969

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS

Relationships among personality dimensions, driver behavior, and performance in driving-related tasks were studied, and the need to evaluate these relationships in terms of primary personality dimensions was explored. Research indicates that greater field dependence, i.e., perception dominated by overall field organization, is associated with poorer performance in various driving-related tasks. Psychometric studies suggest the appropriateness of Eysenck's higher-order dimensions (extroversion, neuroticism, and psychoticism) in evaluating individual differences in driver behavior. The utility of using subscale scores reflecting the multidimensional nature of the extroversion scale rather than using overall extroversion scores has been demonstrated, as well as covariation between extroversion and field dependence. Reported relationships involving extroversion pertain to impulsivity, sensation-seeking behavior, fast decision time, and verbal and symbolic message types. In general, research implies that subscale scores reflecting primary personality dimensions should be used to assess driver behavior, particularly with respect to traffic sign perception.

by Robert Loo
Publ: Accident Analysis and Prevention v11 n2 p125-7 (Jun 1979)
1979 ; 9refs
Availability: See publication

HS-026 970

CRASH INJURY PREDICTION MODEL

Automobile crash injury was analyzed using data from the Crash Performance Injury Report for crashes occurring since 1 Jan 1970 which involved 1969 or newer cars, vans, and pickup trucks. Two important injury prediction variables, functions of impact velocity and vehicle size, were incorporated in the crash injury prediction model. The model was developed using delta V (related to decelerations and forces imposed on vehicle occupants), vehicle weight, occupant age, seating position, crash configuration, and restraint usage to predict the expected abbreviated injury scale (AIS). The expected AIS was then employed to estimate the probability of death and severe injury. Model estimates approximated the observed probability of death and severe injury from the National Crash Severity Study data file. Analysis results emphasize the importance of crash severity measurements such as delta V. Supporting equations are provided and procedural information is appended.

by William L. Carlson
Publ: Accident Analysis and Prevention v11 n2 p137-53 (Jun 1979)
1979 ; 13refs
Research sponsored by the National Hwy. Traffic Safety Administration.
Availability: See publication

HS-026 971

VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION

Methods for evaluating vehicle aggressivity are presented, and a test methodology is introduced which offers the potential to standardize aggressivity and compatibility testing. Aggressivity refers to the characteristic of a vehicle structure that imparts a momentum change to another vehicle and penetrates that vehicle's structure during a crash event. The term also refers to the capability of a vehicle to coexist in a crash environment with a full spectrum of vehicles. Several methods are being investigated by the National Hwy. Traffic Safety Administration and others to measure and evaluate vehicle compatibility. These methods, successful in identifying factors that contribute to aggressivity, include the use of a honeycomb front impact barrier to measure loads across the vehicle frontal area. Analytical methods are available to model a combination of vehicles in frontal collisions and associated occupant responses. A theoretical model to measure aggressivity concentrates on the effective use of energy consumed in a crash event in order to maximize crash protection, minimize aggressivity, and achieve a high level of compatibility. The new methodology uses a deformable barrier in frontal impact testing, modeled to represent a nonaggressive vehicle. The barrier is used as a standard against which aggressivity characteristics of all cars can be measured.

by Carl Ragland
National Hwy. Traffic Safety Administration
Rept. No. SAE-790297 ; 1979 ; 12p 2refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 972

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS

Computer simulation of the four-stroke spark ignition engine was developed to study the effect of variations in engine design and operating parameters on engine performance, efficiency, and nitric oxide (NO) emissions. The simulation computes flows into and out of the engine; calculates changes in thermodynamic properties and composition of burned and unburned gas mixtures within the cylinder through the engine due to work, heat, and mass transfers; and follows the kinetics of NO formation and decomposition in burned gas. The combustion process is specified as an input to the simulation program through the use of a normalized rate of mass burning profile. From this information, the simulation computes engine power, fuel consumption, and NO emissions. Predictions made with the simulation are compared with data from a single-cylinder Cooperative Fuels Research engine over a range of equivalence ratios, spark timings, and compression ratios. Predicted fuel consumption and NO emissions show acceptable quantitative agreement with the data. A parametric study of variations in load, speed, combustion duration, timing, equivalence ratio, exhaust gas recycle, and compression ratio is reported. Parameters selected for the study using a 5.7-liter displacement engine included variations in brake-specific fuel consumption, brake-specific NO emissions, and mean exhaust temperature. Supporting data and equations are appended for thermodynamic properties, energy conservation, and NO kinetics.

by J. B. Heywood; J. M. Higgins; P. A. Watts; R. J. Tabaczynski
Massachusetts Inst. of Tech. Sloan Automotive Lab; Ford Motor Co., Engineering and Res. Staff
E(11-1)-2881; DOT-TSC-1034
Rept. No. SAE-790291 ; 1979 ; 28p 15refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 973

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES

Human response to the thermal environment in air-conditioned automobiles was explored, with emphasis on comfort criteria. In one study, 2,200 subjects were exposed for 45 minutes to an environment of 110 degrees F/40% relative humidity in a 1973 Ford vehicle to evaluate effects of register size, air flow rate, and discharge air temperature on comfort. The time to reach a comfortable condition was not affected by register size, but it varied in the front seat from four minutes (air flow of 400 cubic feet per minute (cfm)) to 18 minutes (150 cfm). In the rear seat, corresponding times were 8.5 and 39 minutes. In another study designed to define criteria for comfort during a prolonged stabilized period after transient cool-down, a 20-mph 30-minute cool-down followed by a 60-minute 40-mph steady-state condition was simulated with a chamber environment of 110 degrees F/ 40% relative humidity and 90 degrees F/70% relative humidity. The average time to reach comfort was reduced by 55% when temperature was reduced from 110 to 90 degrees. At 90 degrees, blower speed was changed three times more frequently, the register vane setting was changed the same number of times in both studies, and the average time before front seat passengers deflected register plumes off themselves was the same in both conditions. Another study determined comfort response to seasonal acclimation. Subjects tested in the winter exhibited a thermal sensation response higher than that of subjects tested in the summer; the time required for winter subjects to reach comfort was longer than for summer subjects.

by Frederick H. Rohles, Jr.; Stan B. Wallis
Kansas State Univ.; Ford Motor Co.
Rept. No. SAE-790122 ; 1979 ; 12p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by Ford Motor Co.
Availability: SAE

HS-026 974

HEATING AND AIR CONDITIONING A HEAVY TRUCK

The design of a climate control system for new highway tractors is described. Engineering is accomplished in three phases: establishing objectives; designing the system; and testing to confirm that objectives are met. General vehicle and specific system requirements were established for a Ford tractor. System design considered operator comfort, zone control, packaging, case design, heater cores, the evaporator core, the condenser core, and control actuation. A multiple heater-evaporator system emerged with performance superior to existing designs. The system has three sets of controls which regulate temperature in driver, passenger, and sleeping areas of the tractor cab. Packaging concepts, selection of the power medium for controls, and system testing are discussed.

by C. J. McLachlan
Ford Motor Co.
Rept. No. SAE-790124 ; 1979 ; 11p 4refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 975

SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES

Design and manufacturing aspects of gas turbine automobile engines are addressed. Gains in cycle thermal efficiency with increasing peak temperatures are examined in view of performance penalties due to engine size effects. Thermal efficiency was investigated using a 75-hp and a 150-hp gas turbine. Attention was paid to current and advanced design and manufacturing technology related to rotor clearances and blade thicknesses. Design and manufacturing limits used to define engine penalties with advanced technology were qualified. Results indicated an improvement of about 15% in thermal efficiency due to increasing the peak cycle temperature from 1850-2500 degrees F for a gas turbine engine suitable for an automobile but requiring advanced technology. Size effects between 75 hp and 150 hp only resulted in about a 2% penalty. With current design and manufacturing technology, the increase in thermal efficiency declines from 15% to 10%, assuming that ceramics can be utilized to achieve a 2500-degree F turbine inlet temperature. Without a ceramic turbine rotor and with cycle temperature limited by the capability of some type of metallic rotor, the gain in thermal efficiency further decreases to about 5%.

by Robert A. Mercure
Department of Energy, Transportation Energy Conservation Div.
Rept. No. SAE-790128 ; 1979 ; 11p 10refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 976

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES

The Detroit Diesel Allison Div. of General Motors conducted a field evaluation program from 1974-1977 on the 300-hp GT-404-3 and the 390-hp GT-505-3 industrial gas turbine engines. The overall program plan involved installations in trucks, coaches, and marine and industrial environments. Emphasis was placed on operator reaction, environmental effects, performance, and field-revealed problems. Two particular applications were explored in detail: bulk hauling trucks with self-unloading capabilities, and Greyhound intercity coach operation with gas turbine power and automatic transmissions. The gas turbine engines performed well in all applications. Operators liked the engines, particularly the smoothness, quietness, and excellent torque characteristics. The performance of heavy trucks and coaches on ice was superior, both during engine braking and starting on hills. Brake life on trucks and coaches was extended by about 50%. Trip time was generally better than with equally powered diesel vehicles. Fuel consumption of the engines was not competitive with comparable diesel engines, being about 15-20% poorer in typical applications, and durability and reliability needed improvement.

by Eugene E. Flanigan; Daniel N. Nigro
General Motors Corp., Detroit Diesel Allison Div.
Rept. No. SAE-790129 ; 1979 ; 28p 2refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 977

MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE

Factors are discussed for selecting the right utility truck and mounting mechanized equipment (e.g. digger-derricks, aerial lifts) to the truck chassis. The installation of mechanized equipment is costly and time-consuming. Utility derricks are normally offered in three different mounting types (right corner mount, centered over rear, and centered behind cab), and utility lifts in two different mounting types (rear mount lift and behind the cab mount lift). Stability, winch options, aerial basket trucks, the truck cab, and four-wheel drive must be evaluated in mechanized equipment selection. The key guide in selection is to get the job done efficiently at minimum cost; this can only be accomplished if the person writing the specifications is thoroughly familiar with the user's requirements or unusual working conditions, as well as with maintenance requirements and operating limitations of the equipment.

by Richard L. Bailey
Alabama Power Co.
Rept. No. SAE-790156 ; 1979 ; 7p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 978

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES

The Lucas electric vehicle battery was developed on the basis of the multiplate multicell automotive battery with its polypropylene case and associated technology, by improving its life cycle capability without losing energy density and departing significantly from standard production methods. The Lucas program consisted of four elements: unit battery cycling (preliminary screening); pack cycling (first stage proving); accelerated in-vehicle testing (second stage proving); and monitored operator usage (third stage proving). The choice of a lead-acid battery for development was made as a result of extensive studies dealing with potential electric vehicle battery systems and transport needs. Key battery requirements defined for testing were an energy density of at least 18 Wh/lb, discharge at about a 2-hour rate in order to meet speed, acceleration and range criteria, and a minimum life cycle in excess of 500 cycles. Testing involved unit battery cycling, laboratory pack cycling, and accelerated in-vehicle operation. Much of the experience gained is applicable to any electrochemical couple being developed for electric vehicle use.

by J. M. Ponsford
Lucas Batteries Ltd., England
Rept. No. SAE-790157 ; 1979 ; 8p 2refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 979

ELECTRIC VEHICLE BATTERY DEVELOPMENT

An electric vehicle battery is being developed that uses expanded metal, nonantimonial alloy grids, enveloped separation/retention, and high-rate production methods of packaging, including through-the-wall construction. The battery is expected to meet Department of Energy goals for the improved state-of-the-art electric vehicle battery and to be further improved to meet department goals for the advanced battery. Capabilities of electric vehicle batteries (existing and under development) are discussed. The design of improved batteries is addressed and design tradeoff studies regarding active materials, separators, electrolytes, and packaging are reported.

by Charles W. Fleischmann
ELTRA Electric Vehicle Group/C and D-Prestolite, Plymouth Meeting, Pa.
ANL-31-109-38-3628; ANL-31-109-38-4206
Rept. No. SAE-790158 ; 1979 ; 12p 32refs
Presented at the Congress and Exposition, Detroit 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 980

240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM

Effects of system variations on battery performance, as expressed by electric vehicle range, were investigated. Electric vehicle performance efficiency is a function of total system efficiency and compatibility. Work with a 240-volt electric vehicle battery power system assumed that higher voltage would yield better efficiency through reduced system resistance and lower current spikes as compared to 120 volts or less. The actual range of the 240-volt battery configuration was approximately 25% less than the 120-volt system. The loss was caused primarily by incompatibility between the motor and chopper control in the higher voltage battery application. Extremely high current spikes resulted from this incompatibility, thus providing the required current in a very inefficient form. High-voltage electric vehicle power systems can provide performance advantages over lower voltage systems only if voltage balances with the total system. Mixing high-efficiency components does not assure total system efficiency optimization. The ability of a battery to release its stored energy is a function of the demand upon it. Higher current demand will reduce battery efficiency.

by K. R. Jones
Globe-Union, Inc.
Rept. No. SAE-790159 ; 1979 ; 8p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-026 998

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES

A bibliography is presented of summaries of research study findings and activities conducted by the Res. and Devel. Section of the Calif. Dept. of Motor Vehicles. The following information is given for each item: title, author(s), funding source, date, report number(s), objective, abstract, implementation of findings and recommendations, and supplemental information. The material is organized under the following headings: driver education and training effectiveness studies; driver licensing screening effectiveness studies; effectiveness studies on improvement and control of deviant drivers; basic research and methodological studies: driver performance, accident etiology, prediction models, and research methods; driver licensing/control systems and safety management studies; studies on special driver populations; and miscellaneous studies and reports. Studies in process are usually listed at the end of each section, and cross references are provided to related studies. An author index, a list of journal publications, a list of available publications by report number, and National Technical Information Service price codes for North America are provided.

by Shara Lynn Kelsey, comp.
California Dept. of Motor Vehicles, Res. and Devel. Section, P.O. Box 1828, Sacramento, Calif. 95809
Rept. No. RSS-DMV-4C ; 1979 ; 154p refs
Availability: Corporate author

HS-026 999

A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN

A two-stage analysis of accident and travel data (Sep 1978-Mar 1979) was conducted, comparing Michigan truck accident experience with that of other motor vehicles (nontrucks). Accident data were compared according to three severity schemes (fatal, personal injury, and property damage) for trucks and nontrucks. Truck accident data were further classified in terms of pickups/panels/vans (PPV's), straight trucks, and truck tractors. A separate comparison of accident data was made between each truck category and all other nontrucks, and accident data for the three truck categories were also compared among themselves. Annual accident rates were computed from historical accident and exposure data, and compared using appropriate statistical methods. Rates were derived by dividing the number of accidents by corresponding exposure data, as indicated by the number of vehicle miles traveled. For fatal and property damage accidents, trucks had a higher rate than nontrucks. For injury accidents, trucks had a lower rate. For all accidents considered together, there were no significant differences between accident rates. In almost all accident categories, PPV's and straight trucks had a higher accident rate than nontrucks, while truck tractors had a higher rate for fatal accidents only. In all other severity categories, truck tractors had a lower rate than nontrucks. Straight trucks had the highest accident record overall, followed by PPV's and truck tractors. Truck tractors had a higher fatal accident rate than PPV's. Recommendations for future studies are included.

by Snehamay Khasnabis; Ali Atabak
Wayne State Univ., Dept. of Civil Engineering, Detroit, Mich. 48202
MVMA-WSU-7904-C1.56
1979 ; 77p 7refs
Sponsored by Motor Vehicle Manufacturers Assoc. of the U.S., Inc.
Availability: Corporate author

HS-027 000

LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS

Automobile leasing company use of small fuel-efficient cars is considered in light of gasoline prices and low availability. The 1980 Gelco Guide organizes 1980 models in five basic selector groups, each targeted to a specific corporate functional area. The "position image" group includes vehicles priced between $6,700 and $8,200, having an average fuel rating of 16 mpg. The "economy" group is comprised of vehicles priced from $4,900 to $5,200, having an average fuel rating of 21 mpg. The mid-size "functional image" group is rated as the one with the best overall value. Selection of the best cars to lease depends on fuel prices, future availability of fuel, and effect of fuel factors on used car prices. One leasing corporation recommends that fleets use mid-size vehicles regardless of the number of miles driven per year and use a large vehicle (115-inch wheel base) only when necessary. Another company suggests upgraded models with more luxurious accessories instead of large vehicles if image is important. Six-cylinder engines are preferred in terms of fuel economy, performance, and durability. Replacement cycles for leased cars are discussed, and specific car models and manufacturers are evaluated. In a separate section, the Free-Way 3-wheeled, one passenger car is described. Built by H-M Vehicles, Inc., of Bloomington, Minn., the vehicle has a fuel economy of 100 mpg with a top speed of 65 mph; the electric version has top speed of 55 mph and can go 40 miles on a single charge. The diesel version's fuel consumption is 140 mpg with a top speed of 60 mph.

Publ: Automotive Fleet v18 n11 p41-4 (Sep 1979)
1979
Availability: See publication

HS-027 001

ANALYSIS OF FATAL ACCIDENT TRENDS ON MARYLAND HIGHWAYS, 1970-1976

Although Maryland's imposition of the 89 km/h (55 mph) speed limit has been credited with the reduction in traffic fatalities, the magnitude of its effect as a "lifesaver" may be less than was previously assumed. A review of previous research reveals that in-depth statistical analysis was not employed. New research was begun in late 1975 to statistically analyze fatal accident data between 1970 and 1976, using various multivariate regression analysis techniques. Four of the fifteen variables studied--the normal historical decline in fatal accident rates with time, changes in the posted speed limit, changes in the level of traffic volume, and increases in police enforcement--statistically contribute to the explanation of the raw variance in the number and rate of fatal accidents. These four variables account for more than two-thirds of the total variance. Techniques for analyzing data from these highly intercorrelated variables are discussed and employed. Additional research is required in other parts of the United States to confirm or deny the results obtained in Maryland.

by Harry S. Dawson, Jr.
Publ: Public Roads v43 n2 p62-8 (Sep 1979)
1979 ; 13refs
Availability: See publication

HS-027 002

RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION

In 1976, the Implementation Division of the Federal Hwy. Administration initiated a series of projects to evaluate the effectiveness of raised pavement markers for guiding traffic through construction zones. During the 1976 and 1977 construction seasons, nine state highway agencies installed several types of reflectorized raised pavement markers on construction projects, including bridge construction, interchange reconstruction, and roadway widening. The cost, spacing, and ease of application and removal of the markers, and their effectiveness as traffic guides during the day and at night were evaluated, as well as the public's acceptance of the markers. The general conclusion of the participating state highway agencies was that raised reflective markers provide excellent nighttime temporary delineation, particularly when the road is wet, at a low cost and with little or no maintenance. On two projects, the use of the raised pavement markers resulted in a reduction of accidents. Comments from construction personnel and the public on the effectiveness of the markers were favorable.

by Charles W. Niessner
Publ: Public Roads v43 n2 p69-75 (Sep 1979)
1979 ; 8refs
Availability: See publication

HS-027 003

PREDICTION OF HIGHWAY TRAFFIC NOISE

The Federal Hwy. Administration has developed and calibrated a model for predicting vehicular noise from highways, based on a method of physically significant adjustments. Use of the model is straightforward and requires minimal training. The model's flexible design allows the more advanced users to modify it to meet specific site requirements. Five levels of sophistication have been developed to extend the model's usefulness: a nomograph, a manual method, a hand-held calculator, SNAP 1.0 (Level 1 computer program), and STAMINA 1.0 (Level 2 computer program).

by Timothy M. Barry
Publ: Public Roads v43 n2 p76-81 (Sep 1979)
1979 ; 7refs
Availability: See publication

HS-027 004

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY

A summary is presented of Road and Track's 1979 congressional briefing and technical presentation on the subject of airbags, made at the invitation of Congressman John D. Dingell (D-Mich), one of eighteen sponsors of an amendment to a Dept. of Transportation appropriation bill that would restrict airbag funding to research and development. Road and Track staff presented data indicating the ineffectiveness of airbags in side crashes and rollover accidents and raised questions regarding airbag cost, effectiveness, reliability, and disposal. Pro-airbag representatives, including Ralph Nader and officers of corporations currently involved in airbag manufacturing, presented contrasting views. Each group claimed that "factual errors" were made by the other.

by Dennis Simanaitis
Publ: Road and Track v31 n2 p24, 26-7 (Oct 1979)
1979
At head of title: Of Immediate Interest
Availability: See publication

HS-027 005

FUEL FOR THOUGHT

A brief summary is provided of the American automaking industry's response to government mandates to "reinvent the automobile" to achieve increased fuel economy. The high cost of meeting government regulations is noted ($1.6 billion for General Motors in 1978). General Motors anticipates a per car cost increase of $390 to reach 1985 fuel economy levels of 27.5 mpg. The need for the prompt development of alternative energy sources is discussed. The possible introduction of new model lines by U.S. and Japanese manufacturers is mentioned, and the present and possible future dissolution of ties between U.S. and Japanese auto manufacturers is briefly discussed.

by Thos L. Bryant
Publ: Road and Track v31 n2 p120-1, 125-7 (Oct 1979)
1979
Availability: See publication

HS-027 006

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE

A reference guide is provided to address short-range traffic engineering and transportation planning needs associated with the urban trucking process, which is described and discussed in terms of traffic volume, types of vehicles, and truck trip characteristics. The scope of the urban trucking process encompasses terminal activities, stem driving (between terminal and pickup/delivery zone), intrazone driving, and stop or dwell time; types of trucks are considered (mostly light trucks with 2 axles and 4 tires), constituting about 15% of urban traffic, with traffic variations according to hour, day and month. Truck trip characteristics affecting traffic include trip purpose, urban truck parking, and truck operations. The need for analyzing energy, environmental, and urban planning factors related to truck use is identified. Approaches are presented for forecasting truck travel, conducting truck short-counts, and estimating truck loading space demand. Guidelines are presented for identifying, implementing, and assessing traffic improvements. Selected improvements to general traffic flow are discussed, including physical system improvements, one-way streets and reversible lanes, improved traffic signal systems, intersection improvements, and peak-period parking prohibitions. Selected short-range truck-oriented improvements include allocation of curb space, operational/physical constraints to trucks (turning radii, weight limits), and restricted roadways. Long-range truck-oriented improvements include designated truck routes and ramps, development of off-street and underground truck loading facilities, and use of consolidation terminals.

by Dennis L. Christiansen
Texas Transportation Inst., Texas A and M Univ., College Station, Tex.
1979 ; 182p refs
Sponsored by Federal Hwy. Administration.
Availability: GPO

HS-027 007

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT

Preliminary design specifications were developed for a speed advisory system for use during periods of reduced visibility (fog). Necessary facilities, equipment and procedures to conduct controlled experimentation under various levels of fog density were developed. A series of interrelated experiments were performed to identify optimum advisory information (sign messages and speed values), and the number, locations, and interconnections between signs which would result in the smoothest traffic flow. This information, as well as the pertinent literature, was utilized to develop preliminary specifications for a full-scale advisory system for use on the public highway. Results indicate that a single speed advisory sign prior to a fog zone will result in earlier and more gradual driver deceleration and reduced traffic flow instability. Data analysis indicates optimum posted speeds for each set of visibility conditions. Raised reflective centerline and/or edgeline buttons did not significantly increase traffic flow stability, although 91% of the subject drivers regarded them as an aid in keeping on the road in light and moderate fog. Sign-by-sign analysis indicated that the use of speed differentials and active (flashing) signing yielded lower speeds and smoother deceleration profiles.

by Donald R. Wagner
Oregon Dept. of Transportation, State Hwy. Div., Transportation Bldg., Salem, Oreg. 97310
DOT-FH-11-7950
Rept. No. FHWA-RD-78-80 ; 1978 ; 12p 3refs
Rept. for Sep 1972-Mar 1978. For complete report, see HS-026 956.
Availability: NTIS

HS-027 008

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT

Criteria, procedures, and significant data are identified for use in planning and evaluation of both comprehensive pedestrian systems and individual facilities. The pedestrian planning context is presented in terms of its historical background, the need for pedestrian facilities, the objectives of pedestrian planning, and the relationship to land use/transportation planning. An overview is provided of pedestrian system modelling, design, and evaluation. The state of the art and rationale for selection are presented, and the application of the planning process is discussed.

by L. S. Kagan; W. G. Scott; U. P. Avin
RTKL Associates Inc., The Village Square, Village of Cross Keys, Baltimore, Md. 21210; Kilkeary, Scott and Associates, Inc., 509 Powell Dr., Annapolis, Md. 21401
DOT-FH-11-8816
Rept. No. FHWA-RD-79-45 ; 1978 ; 120p
Rept. for Jun 1975-Nov 1978. Vol. 2, Procedures, is HS-027 100; Vol. 3, Technical Supplement, is HS-027 101.
Availability: NTIS

HS-027 009

THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)

Information on side impact fatal accident cases was extracted from the National Hwy. Traffic Safety Administration's 1977 Fatal Accident Reporting System (FARS) files, combined with parallel information from the National Crash Severity Study (NCSS), and used to estimate the relative frequency of various kinds of side impact collisions. The analysis, restricted to passenger cars, estimated the number of fatalities, the total number of occupants in all towaway crashes, and the ratio of these two numbers. Data are shown for right and left side impacts, for vehicles impacted by other cars, by trucks, or by fixed objects, and for drivers vs. other seating positions. About 60% of the side-impact fatalities in passenger cars in the U.S. occur as the result of the car being struck by a truck or striking a fixed object; most of the other 40% result from impact by another passenger car. This analysis was undertaken to assess the value of the FARS data in providing an understanding of a particular accident type. The conclusion is drawn that FARS is useful now, and is likely to be more so in the future. Since it contains the census of fatal highway accidents in the U.S., conclusions drawn from this file are limited only by inaccuracies in the data and not by statistical sampling considerations.

by James O'Day; Richard Kaplan
University of Michigan Hwy. Safety Res. Inst., Ann Arbor, Mich.
Rept. No. SAE-790736 ; 1979 ; 10p 9refs
Presented at the Passenger Car Meeting, Dearborn, 11-15 Jun, 1979.
Availability: SAE

HS-027 010

THE MOPED REPORT

A "state of the art" study was conducted on the moped in Ohio and other states to assess its impact upon traffic safety and to provide suggestions for future action. A brief history of the moped in Europe and the U.S. is presented, as are findings on the impact of moped market growth and a history of Ohio legislation governing mopeds. Although a general lack of moped accident data is recognized, five studies sponsored by the National Hwy. Traffic Safety Administration are briefly described. Tabular data are presented on moped legislation in 36 states and the District of Colombia and on moped operating specifications (maximum speed, brake horsepower, engine displacement, operator age, and operation requirements). Moped popularity is attributed to its mechanical simplicity, economy, and environmental desirability. Major factors affecting moped safety are the youth and inexperience of many riders; improper braking and signalling; lack of protective clothing and headgear; overloading (with passengers or parcels); lack of power; poor visibility; and vehicular instability. Recommendations developed by the Ohio Board of Education call for increased research and improved Federal standards (specifically Federal Motor Vehicle Safety Standards 108 and 123) and legislation which defines the moped and mandates safety rules, age limits for ridership, and testing/licensing/registration procedures. Other recommendations are for structural modifications to mopeds and automobiles to reduce collision-related injuries, and for improved consumer/rider education programs. Appended are Federal Motor Vehicle Safety Standards relating to the moped, Ohio rules for motorized bicycle equipment and qualifications, current moped legislation in Canada (tabulated), a course outline for moped safety, and a bibliography on mopeds.

Ohio Dept. of Education, Driver Education Section, 65 South Front St., Room 811, Columbus, Ohio 43215
1978 ; 139p refs
Availability: Corporate author

HS-027 011

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978

Over 25 papers and panel sessions are reported from a conference designed to provide an opportunity for decision-makers, engineers, and planners to update their skills and understanding of transportation and energy issues. Five papers covering energy efficiency, energy transportation studies, and transportation energy conservation were presented at two general sessions. Sixteen papers are reviewed from six work sessions on the following topics: environmental effects of conservation, social and economic effects of conservation, modal energy efficiencies, practice in traffic operations and engineering, practice in regional transportation and land use approaches, and practice in institutional analysis. Four other papers are reviewed from an evening short course on ethics for a people-serving profession. Also included are five papers submitted for publication which cover transportation efficiencies and vehicle occupancy rates, intercity freight energy policy analysis, a transportation energy conservation case study (Pennsylvania), a technique for assessing the fuel conservation program of a ground transportation system, and coal haul road research and mapping.

American Society of Civil Engineers, 345 East 47th St., New
York, N.Y. 10017
1978 ; 454p refs
Includes HS-027 012--HS-027 034. Conference co-sponsored by
Federal Energy Administration, Federal Hwy. Administration,
Energy Res. and Devel. Administration, and Dept. of
Transportation.
Availability: Corporate author $5.00

HS-027 012

SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)

In a summary of the conference on transportation and planning, Dr. Bellomo outlines the major policy issues: need for improved institutional arrangements and regulatory reform; significance of short-term transportation energy conservation measures; lessons to be learned from development of Transportation Control Plans by the Environmental Protection Agency; how to deal with the revenue shortfall due to lower fuel consumption and higher highway construction and maintenance costs; and balancing supply and demand for energy. The issues are discussed from the Federal, Congressional, state, local, and private perspectives. A discussion of issues and opportunities in the practice of planning and engineering includes institutional concerns, modal efficiency, traffic operation and engineering, regional transportation/land use planning, and impact assessment. It was concluded that there is need for leadership by the civil engineering profession.

by Salvatore Bellomo
Planning Environment International, McLean, Va.
Publ: HS-027 011, "Transportation and Energy," New York,
1978, p1-17
1978
Presented at the Urban Transportation Div., American Society
of Civil Engineers, Specialty Conference, Washington, D.C., 22-
24 May 1978.
Availability: In HS-027 011

HS-027 013

TRANSPORTATION CONSERVATION: CAN WE DELIVER?

The worsening balance of payments suffered by the U.S. as a result of increased oil imports is described, as is the less than expected fuel economy of vehicles. The highway vehicle is seen as the largest single consumer of energy. Elements of the National Energy Plan are outlined: taxes for fuel-inefficient cars, tax credits for home insulation, encouragement of coal conversion, natural gas deregulation, utility rate reform, and the crude oil equalization tax. Proposals are made for state and local initiatives in conserving transportation fuels: promote more efficient transportation modes (i.e. carpools, enforcement of 55 mph speed limit, priority to high-occupancy vehicles), improve vehicle efficiency (by graduated registration fees, elimination of unnecessary traffic controls, efficient vehicles for state fleets), and discourage use of private automobiles (parking control, zoning regulations). Conservation options under development for the future are described: promotion of improved vehicle management practices (procurement, maintenance, operation), promotion of ride-sharing and vanpools, electric vehicles, synthetic fuel (gasohol), and new engines (Stirling, gas turbine). The conference's emphasis on near-term conservation options is applauded, since transportation will bear the brunt of any future fuel crisis, and agreement is urged on decisions that will lead to prompt action.

by Sydney W. Berwager
Department of Energy
Publ: HS-027 011, "Transportation and Energy," New York,
1978, p18-33
1978
Keynoted address presented at Urban Transportation Div.,
American Society of Civil Engineers, Specialty Conference,
Washington, D.C., 22-24 May 1978.
Availability: In HS-027 011

HS-027 014

ENERGY EFFICIENCY: WHICH MODES, WHICH PROGRAMS?

The analysis presents several measures of energy use, from propulsion needs to program energy savings. Under consideration are the energy needs for building roadways and tracks, for manufacturing and maintaining vehicles, for heating and lighting stations, and for driving to stations. Also considered are the directness of alternative modes of travel, and the energy implicit in travel patterns prior to changes in public transportation policy. These energy components of urban transportation are combined to form an hierarchy of four measures of energy use, including means of computation: energy intensiveness, line-haul energy, modal energy, and program energy. Using these measures, the following alternative transportation modes are compared: carpool, vanpool, dial-a-ride, heavy rail transit (new), commuter rail, light rail transit, and express bus service (new). Of these, carpooling and vanpooling offer the greatest potential for fuel conservation per passenger mile. Express and other innovative bus services promise substantial savings per passenger mile and offer greater opportunity for Federal promotion efforts. Since heavy rail relies on automobile access and draws from other energy-efficient modes, it does not appear to be a good basis for a fuel conservation program. Dial-a-ride is found to be the least fuel-efficient alternative, although it has social advantages for transporting the elderly and handicapped.

by Damian J. Kulash
Congressional Budget Office
Publ: HS-027 011, "Transportation and Energy," New York,
1978, p34-56
1978 ; 2refs
Presented at Urban Transportation Div., American Society of
Civil Engineers, Specialty Conference, Washington, D.C. 22-24
May 1978.
Availability: In HS-027 011

HS-027 015

ENERGY TRANSPORTATION STUDIES AND RELATED ISSUES

The National Energy Transportation Policy Study, planned by the Departments of Transportation and Energy, is discussed, as well as the results of recently completed transportation energy studies and various administration positions on transportation issues. Among the issues to be addressed by the planned study are the adequacy of railroad rates; environmental problems of increased coal transportation; financing the upgrading of roads in areas of coal mining operations; evaluation of the pipeline system; transportation of oil and gas; the need for new pipelines; and environmental and financial problems of unit train traffic, high-voltage electrical power transmission, and nuclear waste transportation. Topics of other studies include coal slurry pipelines, transportation of Alaskan crude, and liquified natural gas transportation.

by Jack Daly
Department of Energy
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p57-60
1978
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
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HS-027 016

TRANSPORTATION ENERGY CONSERVATION IN COLORADO

The role of transportation fuels in energy demand is addressed, especially in Colorado where the economic activities (agriculture and tourism) are energy intensive. The efforts of the Colorado Dept. of Highways in reducing transportation energy consumption are outlined. The 1977 Colorado State Energy Conservation Plan (SECP) is described, which projects an 8% reduction in energy consumption in 1980. Transportation measures in the SECP include the state bikeway program, urban area carpooling, vanpool demonstration program, public transportation improvements (exclusive bus lane, exclusive transit right-of-way, park-n-ride lots, high-occupancy vehicle lanes), purchasing of energy-efficient vehicles and equipment, 55 mph enforcement, and staggered work hours. Other state programs include asphalt recycling, evaluation of solar and geothermal energy, and natural ventilation of the Eisenhower Tunnel which presently costs $40,000/month for electricity. Long-term changes are envisioned in land use and metropolitan planning. Energy conservation impacts on highway finances are outlined, as well as problems of energy production which include providing highway facilities for greatly increased coal movement and its impact on highway/railroad crossings.

by Jack Kinstlinger; Adam Poe
Colorado Dept. of Highways
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p61-70
1978 ; 1ref
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
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HS-027 017

TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT

The relation between air pollution control and urban transportation is discussed, with particular emphasis on factors affecting transportation planning. Of two basic issues, the first concerns the relation between transportation measures that improve air quality and those designed for other purposes; the second issue concerns the structure of urban transportation planning and decision-making for integrating air quality considerations into all phases (planning, decision-making, and implementation). The role of transportation planning and system management in air pollution control involves vehicle emission controls of carbon monoxide, hydrocarbons and nitrogen oxides, and implementation plans for local ambient air pollution control by improving traffic flow conditions and reducing traffic volume. Transportation measures that address specific air quality needs are identified as traffic engineering measures to improve traffic flow, transit improvement, and other measures to encourage use of high-occupancy vehicles and to discourage use of low-occupancy vehicles. Specific measures include auto-free zones, charging vehicles for entry into the central business district, improved transit service, and reduced transit fares. Provisions for integrating air quality considerations into transportation planning and decision-making are included in the Clean Air Act Amendments of 1977. The provisions require local coordination of transportation and clean air planning and encourage participation by elected officials and the public.

by Joel Horowitz
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p71-86
1978 ; 12refs
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HS-027 018

TRAVELERS' ATTITUDES AND ENERGY CONSERVATION

The factors which tend to affect travel behavior are discussed from three viewpoints: exogenous influencing factors (price and availability of fuel, price of automobile, transit availability, and level of service), household influencing factors (income, stage of life cycle, auto ownership, fuel efficiency of vehicle, and trip purpose and length), and individual influencing factors (education, income, stage of life cycle, sex, and location of residence or work place). The evidence of these influencing factors is described from opinion surveys regarding the 1973-1974 oil embargo, and related attitudinal and situational surveys. Results of a 1977 survey designed to identify attitudes and perceptions toward transportation problems and toward public and private transportation options indicate that Americans recognize that changes are taking place in their way of life and that they expect to make sacrifices. The American people tend to favor policies that increase transportation options and to oppose policies that limit options. Promising initiatives are: improving gas mileage in cars, improving and expanding public transportation, and encouraging carpooling. The automobile is valued for its speed and flexibility, and carpooling is expected to increase. Younger adults seem especially aware of transportation issues and problems. Consumer values related to new automobile purchases tend to stress interior size, with comfort and fuel efficiency following closely. There is increased interest in vans and trucks among certain groups.

by Sally D. Liff
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p88-108
1978 ; 23refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
Availability: In HS-027 011

HS-027 019

TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE

An assessment of energy conservation technologies in New York State transportation was broadened to include the form of transportation demand, programs, and policies. Energy savings were considered by three basic mechanisms: conservation, efficiency, and substitution. Three areas recommended for attention include motor vehicle transportation, transportation demand and planning, and public transportation. Among the topics discussed are transportation energy use, motor vehicle efficiency, transportation policies and programs, and public transportation (rail, bus, and paratransit). Opportunities for energy conservation cited as future possibilities include alcohol gasoline blends (raw materials available in New York), electric and hybrid vehicles, and diesel and other engines.

by William R. McShane; William H. Crowell; Louis J. Pignataro
Polytechnic Inst. of New York, Transportation Training and Res. Center
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p110-25
1978 ; 3refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978. Based on assessment sponsored by New York State Energy Res. and Devel. Authority.
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HS-027 020

LIGHT VEHICLE TECHNOLOGY SUBSITUTION

Based on a broad definition of new technology and a premise that light vehicles will continue to be the principal means of transportation, the determinants of new technology substitution are examined. The crucial agent compelling technology substitution is exhaustion of petroleum resources. Policies designed to reduce the use of automobiles are politically unfeasible. It is stated that synfuels (from biomass, coal, shale, and tar sands) and electric vehicles (EV'S) are the only significant technology presently available. Cost is the principal deterrent to synfuels, as well as the lack of an existing infrastructure for large-scale production and distribution; vehicle technology will not need to be changed drastically. Conversely, the infrastructure exists for fueling EV'S; the problem lies in improving vehicle batteries. Critical barriers to the introduction of new vehicle systems technologies are discussed: Federal energy policy, which is based on continued use of petroleum fuels, and lack in the U.S. of cooperation between the public and private sector such as exists in Europe and Japan. Timing of the decision to convert either to synfuels or to EV'S is crucial to an orderly transition away from exhaustible petroleum resources.

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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p126-37
1978
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
Availability: In HS-027 011

HS-027 021

ENERGY CONSERVATION IN URBAN TRANSPORTATION

In the light of the high oil consumption by transportation (97% of transportation energy is from oil; transportation uses 55% of all oil used in the U.S.), the possible approaches to energy conservation in urban transportation are reviewed in four categories: reduction of miles traveled; increase in passenger miles per vehicle mile; increase in vehicle miles per gallon or kilowatt-hour; and substitution of other energy sources for petroleum. Activities of the Urban Mass Transportation Administration (UMTA) are outlined under each category. To reduce miles traveled, low-occupancy vehicle travel is discouraged by exclusive bus lanes, auto-free zones, and parking restrictions; high-density land use is encouraged. To increase passenger miles/vehicle mile, conversion from automobile to transit, carpool, or vanpool is being demonstrated by UMTA in Knoxville, Norfolk, Minneapolis, and Marin Co., Calif. Reduction of energy consumption per vehicle mile is accomplished by increased efficiency in engines, drivelines, and accessories; reduced weight, rolling friction, and aerodynamic drag; use of braking energy; and replacement of under-utilized buses by paratransit. Examples are UMTA'S diesel taxi project, and installation of a flywheel in railcars and in diesel and trolley buses to store braking energy. Substitution of petroleum by other fuels (methanol, propane, hydrogen) and by use of electricity in rail systems, trolley buses, and hybrid buses is being explored.

by Wilhelm Raithel
Urban Mass Transportation Administration
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p138-45
1978 ; 2refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
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HS-027 022

TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS

Some similarities and differences are outlined between earlier efforts to improve air quality through transportation controls and the current effort to conserve transportation energy. In both efforts, the decision-making processes were opened to state, metropolitan, and/or local agencies which had previously been only marginally involved. The differences lie in internalized benefits (consumers derive a greater direct benefit from energy conservation), geographical scale (air pollution was more localized), and time horizons (public appreciation of the energy crisis disappeared after the end of the Arab embargo). The lessons to be learned from air quality controls include those of conflicting objectives (trade-offs), intergovernmental and interagency relations (need for cooperation), metropolitan scale (appropriate area for making transportation trade-offs), attitudinal and behavioral constraints (problems of instilling a conservation ethic in the public), legal and regulatory constraints, and resource allocations. It is recommended that governmental agencies devise adaptive and flexible ways to reevaluate policies, programs and institutions to respond to changing values, goals, and conditions.

by Carl S. Rappaport
Department of Transportation, Office of the Assistant Secretary for Policy and International Affairs
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p180-7
1978 ; 2refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
Availability: In HS-027 011

HS-027 023

ENERGY AND EMISSIONS: THE SIMULATION APPROACH

Recent applications of computer simulation techniques by the Federal Hwy. Administration (FHWA) are described for the determination of energy consumption and vehicle emission characteristics in urban traffic and the effects of traffic control on energy consumption and emissions. UTCS-1, an FHWA surface street simulation model, was modified to estimate fuel consumption and emissions and was renamed NETSIM; another FHWA detailed freeway model, INTRAS, can also estimate fuel consumption and vehicle emissions. Experimentation with these models indicated that facilitation of vehicle movement usually directly improves fuel efficiency and vehicle emissions. Measures which improve average speed of vehicles in networks (i.e. one-way streets, pre-timed signals, right-turn-on-red) also proportionately improve fuel efficiency and emissions at least in cases where change in overall speed is due to changes in average number of stops and traffic interference. A traffic change which increases vehicle miles may result in a net increase in fuel consumption and vehicle emissions. It was also shown that pollution concentrations are much greater at intersections than at midblock; that pedestrian scramble systems (allowing pedestrian crossing in all directions at one signal phase) generally degrade speed, fuel consumption, and vehicle emissions; and that increased traffic density degrades traffic performance of a network, and increases fuel consumption and emissions.

by Stephen L. Cohen; Gary W. Euler; Guido Radelat; Paul Ross
Federal Hwy. Administration, Office of Res.
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p193-215
1978 ; 20refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Speciality Conference, Washington, D.C., 22-24 May 1978.
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HS-027 024

DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS

A methodology is described for providing up-to-date relationships among fuel consumption, emissions, vehicle operation, and highway design. A computerized fuel consumption and emissions model is designed to enable the designer or analyst to determine the fuel consumption and emissions that would result under any given conditions. The primary input categories for the model are roadway design parameters (grade, curvature, superelevation, pavement type, and length of section under analysis) and traffic flow characteristics (speed profile, vehicle mix, and traffic volume); a secondary input is provided for environmental conditions (precipitation, wind, and ambient temperature and pressure). Two principal submodels are the torque-roadway design correlation model and the fuel consumption/emissions rate model. The basic data for the submodels require a set of road tests to establish the relationships among energy (driveshaft torque), vehicle speed, and road geometry, and a set of dynamometer tests to establish the relationship among driveshaft torque, vehicle speed, and resulting fuel consumption and emissions. Tests will be made on a limited cross section of vehicle types (compact, subcompact, and intermediate cars, and four weight classes (2500-5500 lb) of trucks). By using the model, impact on energy and pollution can be assessed when a change is contemplated in roadway design, in the speed profile of a traffic stream, or in the composition of the vehicle mix. The basic data cells can be updated through a dynamometer test program whenever significant changes in vehicle fuel consumption and emissions occur. Applications of this project include determining fuel tax structures and rates, and justification and formulation of traffic management and air quality improvement programs.

by P. Brach; S. Bellomo; J. Mehra; M. McDonald
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p216-39
1978 ; 16refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978. Research sponsored by Federal Hwy. Administration.
Availability: In HS-027 011

HS-027 025

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS

An analysis is presented of gasoline consumption and air pollution resulting from stop, yield, and no sign controlled intersections under various traffic volume conditions. The data were obtained through the use of Federal Hwy. Administration and Environmental Protection Agency computer programs, modified to simulate traffic flow and energy consumption analysis, respectively. Regional estimates indicated a potential saving of several million gallons of fuel per year in Indiana alone, depending on the low-volume intersection signing policy adopted by municipal, county, and state authorities. A procedure is discussed to guide transportation engineers to an areawide optimal signing policy. More selective implementation of the proper type of control for unsignalized low-volume intersections can result in elimination of substantial waste in fuel without any technological breakthrough, without any financial investment, and without a long development delay. Improved vehicle emissions in suburban and urban locations are a side benefit of the program.

by Dana L. Hall; Kumares C. Shinha
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p240-53
1978 ; 8refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978. Research sponsored by Hwy. Extension and Res. Proj. for Indiana Counties.
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HS-027 026

ENERGY IMPACTS ON PASSENGER TRANSPORTATION

Three national energy scenarios are outlined for 1990, with their impacts on the Tri-State Region (parts of New York, New Jersey, and Connecticut). The Tri-State Region received 13.1% of the nation's imported oil and 5.3% of its domestic production in 1975, a total of 1.33 MBD (million barrels of oil/day). This level would rise to 1.67 MBD under the "high" scenario, 1.45 MBD under the "NEP" (National Energy Plan) scenario, and would remain at 1.33 MBD under the "low" scenario, assuming 1975 allocation percentages. Demand analysis of the residential, commercial, industrial, utility, an non-auto transportation sectors indicates that non-automotive requirements for oil will increase under each scenario between 1975 and 1990. Regardless of scenario, the Region's automobiles will not have the gasoline required to make the 22% additional vehicle trips over the 1975 level forecast for the Region without energy constraints. Achievement of even a 6.7% increase in auto vehicle miles of travel is possible only if virtually all the Region's passenger cars are subcompacts. A technical approach for assessing the effects of the scenarios is presented, with a sampling of policy alternatives for ameliorating the situation. Among the alternatives discussed are supply rationing (coupons, restricted sale hours), price rationing, driving restrictions and disincentives (Sunday driving ban, speed restriction, carpool lanes, and tolls), and taxation.

by Edward Beltrami; T. Owen Carroll; Thomas R. Sexton; Dennis R. Young
State Univ. of New York, Stony Brook, N.Y.
TS-R-611
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p254-76
1978 ; 8refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978. Research sponsored by Tri-State Regional Planning Commission.
Availability: In HS-027 011

HS-027 027

TRANSPORTATION ENERGY CONSERVATION PLAN

A study was undertaken to define the transportation measures applicable to the northest Ohio region which can reduce fuel consumption while affecting access and mobility as little as possible, requiring low capital investment, and having the least adverse impact on the community and the environment. The project was designed to produce a set of transportation actions, to prepare a preliminary evaluation of their potential effectiveness and impacts, and to develop a handbook of methodologies. Potential transportation actions were identified and screened by the following criteria: cost of implementation and operation, responsible agency, technical feasibility, geographic applicability, public credibility, institutionl/legal barriers, implementation time, and estimates of regional energy reduction. Transportation actions included measures to increase car and van occupancy, to increase transit/paratransit patronage, to improve the flow of high-occupancy vehicles, to improve total vehicular traffic flow, to encourage walking and bicycling, to improve efficiency of goods movement, to restrict traffic, transportation pricing, and to reduce the need to travel. These potential actions were grouped into three packages to achieve three levels of energy savings, ranging from 5% to more than 15% aggregate reduction in transportation energy consumption. Further analysis and application of the techniques are recommended.

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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p277-300
1978 ; 11refs
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HS-027 028

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.

The Washington, D.C. area car and van pooling program, Commuter Club, is described. In its fifth year of operation, the program is supported by the Departments of Transportation of Maryland, Virginia, and the District of Columbia, and the Federal Hwy. Administration. Commuter Club provides car pool matching services through a computerized system. The program was evaluated by a telephone survey of applicants to determine its overall impact and effectiveness, and to discover the methods used to attract participants, the uses made of the information provided, prior mode of transportation of carpool participants, reasons for forming carpools, community benefits, and attitudes of applicants toward the program and carpooling in general. The survey indicated that 15% of those responding were assisted by Commuter Club in entering carpools. During the program's tenure, 63.5% of respondents had entered a carpool at some time. Principal cited reasons for nonuse of the provided carpool information were that respondents formed their own carpools or were satisfied with an existing pool. Principal reasons for forming carpools were (in desending oder) cost savings, time savings, convenience, and special parking privileges. Comments on carpooling and on Commuter Club were over 80% favorable by those still carpooling and only slightly less favorable by others. Average auto occupancy was 4.1 persons per pool, average duration was 23.2 months, trip length averaged 10 miles, and travel time averaged 35 minutes. Nearly half the respondents had driven alone before carpooling; only 25% had changed from transit. Economies due to Commuter Club were estimated at 48-58 million miles, 4.0-4.9 million gallons of fuel, and $7.0-$8.5 million in user operating expenses. Reduced pollution was estimated at 1315-1578 tons of carbon monoxide, 96-115 tons of hydrocarbons, and 77-92 tons of nitrogen oxides. A copy of the survey questionnaire is appended.

by William C. Canup; Philip S. Shapiro
Metropolitan Washington Council of Governments
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p301-16
1978 ; 1ref
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HS-027 029

TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION

The institutional factors and issues are explored which affect the amount of progress toward implementing energy conserving transportation actions. Illustrative transportation actions are tabulated under three categories: those degined to facilitate travel by modes other than automobile; those intended to increase the energy efficiency of auto use; and actions intended to discourage auto use. The apparently slow response by institutions to policy initiatives encouraging energy conservation in transportation is due in part to lack of consensus about the length and seriousness of the energy crisis, to a belief that conservation measures have minimal benefits, and to a lack of funding for transportation agencies. It is concluded that the usual recommendations for speeding up response to energy conservation implementation programs (publicity campaigns, funding, Federal agency coordination) are not efective and that the Federal government must insist that annual progress in conserving transportation energy be tied to further Federal aid. The transportation planning process should be well defined, with the responsible agency clearly specified, with periodic review, evaluation, and revision of experiments, and with consideration of multiple objectives.

by Elizabeth A. Deakin
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p317-25
1978 ; 13refs
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HS-027 030

ENERGY CONSERVATION--TECHNIQUES AND RESULTS

State and Federal efforts to conserve transportation energy are described. Tangible results are being realized from state conservation plans recently approved and in the process of implementation. Specific conservation measures mandated in state programs are right turn on red, thermal and lighting efficiency standards for buildings, promotion of carpools/vanpools and public transit, and energy-efficient state procurement practices. Some recommended significant alternative measures include 55 mph speed limit enforcement, vehicle exhaust emission inspections, implementation of transport system management plans, drag-reduction devices on trucks, and varaible registration fees according to fuel economy. Thus far, energy saving from the above measures has not represented a large proportion of overall energy savings. Price rationing of gasoline is recommended as an apolitical and effective measure. Also recommended is overcoming institutional and legal constraints to measures already approved. The need is stressed for a broad-based, aggressively implemented, overall energy conservation plan, rather than undue reliance on energy saving in one field.

by Howard I. Reynolds; Charles O. Pratt
Wilbur Smith and Associates, New Heaven, Conn.
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p326-40
1978 ; 10refs
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HS-027 031

THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM

The development of employee transportation programs at 3M Co. is outlined, beginning with initial programs in 1972 and 1973, which involved staggered work hours, subcription buses, Ride-Guide (carpooling) and Commute-A-Van (vanpooling). A 1974 report on personnel travel characteristics indicated that the programs reduced traffic overloads on the surrounding road networks, eased traffic flows at the 3M Center (international headquarters, eastern suburbs of Minneapolis-St. Paul), and reduced the need for additional parking at the Center. A 1977 survey indicated that the number of drivers has increased and average vehicle occupancy has decreased since 1974, but the situation compares favorably with that of 1970. The Commute-A-Van, which is described in detail, was judged successful.

by C. Todd Heglund; Robert D. Owens
Barton-Aschman Associates, Inc.; 3M Co.
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p341-57
1978
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HS-027 032

TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES

Intercity and intracity travel modes in the U.S. were investigated in terms of existing energy consumption (Btu/passenger-mile), with focus on passenger loadings per vehicle for each type of modal service. The study was designed to identify methods for increasing vehicle occupancies and to determine their resulting effect on transportation efficiency. Current transportation comsumption patterns are documented followed by a series of policy choices for achieving higher vehicle loadings. The brokeage approach to higher occupancy levels for paratransit is explained, as well as for private automobile and conventional transit. The primary duty of the agent (broker) is to market programs selected by the respective jurisdictions; the programs are merged into a single implementation package, developed according to the site-specific conditions of the area. A strong marketing effort is required to raise vehicle occupancy rates. Advantages of the program are that new technology is not required and that travel preferences are unaffected.

by Eric L. Bers
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p358-69
1978 ; 8refs
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HS-027 033

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA

Comments and evalutions are presented on the energy conservation program recommended by the Pennsylvania Dept. of Transportation in relation to the transportation elements of the Energy Policy and Conservation Act promulgated by the Dept. of Energy (then the Federal Energy Administration). The following four program measures in Pennsylvania's Conservation Plan are outlined: to promote availability and use of carpools, vanpools, and public transportation (by carpool/vanpool matching and promotion campaign, park-and-ride lots, preferential traffic control for carpoolers and transit patrons, area or facility tolls); to permit right turn on red after stopping; to increase enforcement of 55 mph speed limit (fines and penalties, public education); and to increase motorist awareness of efficient vehicle operating techniques by initiation of a public education campaign aimed at 16-19 year old students in high school driver education courses, existing drivers, and fleet drivers for private companies. The following energy saving estimation methodologies were surveyed: those of the Federal Energy Administration, Pennsylvania's procedures, and demand elasticities procedures. A synthesis of these and other methodologies has elicited four sets of forecasting variables: policy variables, behavioral factors, traffic variables, and energy consumption. These variables were combined in an evaluation formula from which the following conclusions were drawn: the total transportation energy savings from Pennsylvania's Conservation Plan is in agreement with these parallel calculations (although a consistent annual figure would be about 30% lower); a 5% national energy demand reduction for transportation seems reasonable; Pennsylvania's total transportation energy saving is estimated at about 80% of Pennsylvania's share of this reduction. The proportion of energy saved by promotion of carpools and vanpools is somewhat conservative. There is no reduction included for trips by an automobile left at home due to public transportation programs. Areas of profitable further research are outlined and further potential transportation energy conservation measures are recommended, such as increased bicycling and walking, fuel price increases to reduce demand, traffic restrictions, mass transit subsidies, and encouragement of railroad electrification.

by Charles L. Chambers; Yupo Chan
Publ: HS-027 011, "Transportation and Energy," New York, 1978, p385-402
1978 ; 16refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978.
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HS-027 034

A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM

A study was made to devise an implementable procedure for estimating the fuel saving potential of a transportation modal shift (from private automobile to public transportation). Since the procedure is designed to be used in emergency situations, only readily available data are used in a formula involving excess transit capacity and potentially divertable trips in a case study approach. A case study of Kansas City, Kans. is used for illustration. For an estimate of excess transit capacity, the "expansion factor" (ratio of the maximum number of person-trips a transit vehicle can carry to the total number of seats available in the vehicle) concept is quite practical. Parameters developed from transit system constraints and comprehensive origin and destination (O-D) survey data were used to define "potentially divertable auto trips." Further research is recommended to develop a modal split model based on total possible transit riders, to develop transit ridership market estimation schemes, and to develop emergency contingency plans for intracity mass transit during fuel shortages. Improved data collection and recording operations are recommended in transit rider usage (O-D), passenger counts, and car registration-composition tabulations.

by Joe Lee
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Publ: HS-027 011, "Transportation and Energy," New York, 1978, p403-14
1978 ; 6refs
Presented at Urban Transportation Div., American Society of Civil Engineers, Specialty Conference, Washington, D.C., 22-24 May 1978. Research sponsored by the National Science foundation.
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HS-027 035

THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL

The production of oil and gas from coal is discussed in terms of the technological and economic factors involved in meeting the 1980 synthetic fuel goal of 1.5 million barrels per day. The overall costs of such a program are estimated between $60 billion and $80 billion, with individual plants priced between $2 billion and $5 billion. Actual costs may be higher, since the estimated are not based on actual plant experience. Basic coal gasification technology dates from before 1813, and the extraction of fuel grade products has been feasible since 1936 using the Fischer-Tropsch procedure. The development of coal gas as an alternative to natural gas has failed in the United States due to rising construction costs and protracted litigation. Coal liquification to produce methanol could be directly competitive with methanol production from natural gas. Mobil Oil Company has developed a procedure to convert methanol (or any alcohol) to high octane gasoline at a pump price of approximately $1.60 per gallon. Four second-generation liquification techniques seem to have the best prospects for commercialization: the two "Solvent Refined Coal" methods being pursued by Gulf Oil and the Southern Company, which would yield mostly fuel oil and naptha; the "Exxon Donor Solvent" method, which would yield similar products; and the "H-Coal" method, which would yield boiler-fuel substitute and a lighter range of liquids. Production and plant construction, due to the large capital outlays involved, will almost certainly be geared to proven technologies such as the Fischer-Tropsch and Lurgi methods. A separate section (Industry Rediscovers Two Old Fuels: Low- and Medium-BTU Gas," by Pamela Sherrid) notes the renewed use of low and medium BTU gas to replace natural gas in various heavy industries (e.g. Caterpillar Tractor).

by Alexander Stuart
Publ: Fortune v100 n6 p50-2, 57, 60, 62, 64 (24 Sep 1979)
1979
Availability: See publication

HS-027 036

BIOMASS: THE SELF-REPLACING ENERGY RESOURCE

The energy potential of biomass (trees, plants, crops, farm and forest residues, algae, seaweed, and garbage) is assessed. Despite its current popularity, ethyl alcohol derived from corn presently consumes 1.6 to 2.7 BTU'S of energy for the production of each BTU of energy output. U.S. corn production would have to be increased 50% to provide a ten % alcohol additive to the gasoline currently used. Techniques for distilling ethanol from wood, grass, wastes, and other materials are not sufficiently developed for production, although wood is a viable biomass source for both direct combustion and ethanol extraction. The U.S. Forest Service estimates that forest production could be doubled with proper management, and that wood could account for as much as 6% of U.S. fuel needs by the end of the century. Problems associated with forest biomass include the inefficiency of harvesting techniques, the relatively high cost of methnanol distillation (65 cents per gallon), and the high cost of methanol plant construction. The euphorbia, a relative of the rubber plant, produces a hydrocarbon latex which can be made into oil; experimental figures indicate the plant could yield 30 barrels of oil per acre per year at $20 per barrel. Other promising sources are the gaint kelp, which yields methane, and the water hyacinth, which cleans domestic waste water and can be harvested to produce fertilizer and methane. The Dept. of Energy reports that municipal solid waste can provide a larger feedstock for ethanol than all agricultural wastes and surplus crops combined.

by Gene Bylinsky
Publ: Fortune v100 n6 p78-9, 81 (24 Sep 1979)
1979
Availability: See publication

HS-027 037

MATERIALS IN THE '80 MODELS

In order to meet corporate average fuel economy (CAFE) standards of 20 mpg, U.S. automakers have achieved significant weight reductions in the 1980 models through the development and use of lighweight materials. Ford has pioneered the use of graphite-fiber reinforced plastics in certain air conditioner mounting brackets and has used die-cast magnesium in steering column assemblies, mirror system components, and distributor diaphragm housings. Conventional plastics are now widely used in tailgates, heater-core end tanks, and differential cover plates. New plastic compositions have been introduced in bumpers, van hoods, and removable roof panels. In-mold-coated (IMC) plastics will improve the surface characteristics of hoods, fenders, and roof panels on the Corvette, and will eliminate the need for surface sanding during fabrication. American Motors Co. has developed injection-molded fender flairs for the Eagle, and Chrysler has produced an energy-absorbing plastic front bumper system for the Mirada. Aluminum is used for the die-cast Ford automatic overdrive transmission case, as well as for pistons in the Pontiac 4.3 liter V-8, the differential housing and supports in the Corvette, and the wheels and body panels in a variety of models. High strength steel will be used for a number of body panels and structural members, and powdered metals will be applied to transmissions, starter systems, and clutch assemblies. Stainless steel will be used in emissions-exhaust components. Coated and galvanized materials will be applied to a number of body and floor components. A separate section ("Seatmakers Take A Back Seat To No One," by Al Fleming) notes the development of new, lightweight steel, aluminum, and plastic seats, including more comfortable passenger car and truck seats.

by Al Wrigley
Publ: Ward's Auto World v15 n9 p53-6, 58, 60 (Sep 1979)
1979
At head of title: Under the Microscope
Availability: See publication

HS-027 038

HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990

Since 1975 the government of Brazil, through its Proalcool program, has promoted the production and use of alcohol as an alternative to gasoline. Most Brazilian cars presently operate on a mixture of low-octane gasoline and 20% ethyl alcohol, with some government and fleet vehicles operating on pure alcohol. Government incentives to increase the use of alcohol include tax relief for alcohol fuel, restricted weekend gasoline sales in certain areas, and 36 month financing for alcohol-powered car purchases (vs. 12 month financing for gasoline models). Fiat Automoveis S. A. began marketing a 1300cc 147 series sedan designed for the exclusive use of alcohol fuel in July 1979. Although initial models are marked for public agency and fleet use, it is estimated that there will be 100,000 alcohol vehicles by 1980 and 300,000 by 1983. Brazil's automakers have the capacity to produce 100,000 to 200,000 alcohol vehicles per year, and the national alcohol output has increased from 359 million liters in 1975 to 2.6 billion liters in 1978. The 1980 goal of 4 billion liters will indicate that 20% of automobile fuel requirements are being met by alcohol. Achievement of the 1985 goal of 30 billion liters (and elimination of gasoline) will require 1070 new distillaries and the planting of 1% to 2% of the total land area with sugarcane. Technical problems to be met include the conversion of nation's fuel-dispensing equipment and the development of effective "cold-start" mechanisms for alcohol vehicles. A separate section ("The Politics of Proalcool") reports on an interview with Sahid Fahrat, Brazil's minister of social communication.

by Al Fleming
Publ: Ward's Auto World v15 n9 p65-7 (Sep 1979)
1979
Availability: See publication

HS-027 039

NEW-CONCEPT ALL TERRAIN UNDERCARRIAGE DESIGNED

A new concept for a universal all terrain undercarriage (ATU) has been developed by Standard Manufacturing Co. The ATU is a wheeled undercarriage with no exposed axles or differential. It can be adapted to a wide range of carried equipment with a gross vehicle weight range of 7260 to 45,360 kg. The ATU offers good ground clearance and maneuverability over improved or rough terrain. The basic ATU is made up to two identical and interchangeable side frame assemblies. Each side has three axles but more can be added if required. The axles located on the ends are higher from the ground than the center axles. This allows the center axles to carry a larger portion of the gross vehicle weight than the end axles. The combination of the center axle carrying a greater load plus the center wheels basically rolling in a circle when the vehicle is counter-rotating reduces the total skidding effect. Less turning power is required because the turning resistance is reduced. All three axles are jointly chain driven from a common gearbox (or boxes). Any wheel or combination of wheels can receive full power in the event one or more of the wheels on that side is off the ground. The gearbox is driven by a hydraulic motor coupled with a failsafe brake. The hydrostatic effect of the drivetrain system is used as the normal service/working brake. The structural frame is an all-welded tubular box section structure with integral axle supports. The drive chains, sprockets, and axle bearings operate internal to this enclosed box section in an oil bath. The carried equipment support structure can be welded directly to the side frame structure or bolted to the support pads.

Publ: Automotive Engineering v87 n9 p42-3 (Sep 1979)
1979
Based on SAE-790818, "A New All Terrain Undercarriage," by Ray Dean.
Availability: See publication

HS-027 040

CONTINUOUSLY VARIABLE TRANSMISSION HAS HIGH POWER DENSITY

Vadetec Corporation's mechanical continuously variable transmission with power density sufficient for motor vehicle use is described. The special traction drive transmits power over a speed ratio range from 0 to 1:1. It opens possibilities for new driveline types in piston-engined vehicles, and also for powertrains based on gas turbines, flywheel hybrids, and electric hybrids. The Vadetec design is based on the kinematic principle of nutation, the wobbling precessional motion of a body as it rotates about its axis: hence the term "nutating traction drive" (NTD). It has the capacity to transmit greater torques than were considered possible with traction drives, thus achieving power densities required not only for cars, but also for off-highway vehicles. In the NTD, rolling contact motion for high traction coefficients is provided by nutation of a roller member within a stationary reaction member. The unit is made up of five basic components: a transmission case or reaction member, an input or driving member, a nutating or rolling assembly, two control rings or reaction members, and an output or driven member. Detailed schemata and descriptions of the NTD are provided, and two possible gear arrangements are described. Advantages to the NTD include: a maximum Hertz stress in the rolling contact areas of 300 ksi; a capacity for instantaneous response to variations in torque; and a lack of sensitivity to variations in component dimensions. The NTD has fewer than 150 parts and can be easily manufactured. It yields high power densities, and a peak efficiency of 94% has been achieved.

Publ: Automotive Engineering v87 n9 p44-7 (Sep 1979)
1979
Based on SAE-790849, "A High Power Density Traction Drive," by Yves Kemper.
Availability: See publication

HS-027 041

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS

Scientists at Toyota and Nippon Soken have encountered a form of self-ignited combustion while studying two-stroke engines under light loads. It was found possible to dispense with spark ignition, improve fuel economy, and decrease hydrocarbon emissions while maintaining highly stable combustion conditions. This type of combustion, dubbed Toyota-Soken (TS) combustion, occurs at low pressure and temperature, is unrelated to "dieseling", and is shown to be related to the formation of chemical radicals in the combustion chamber. Studies were conducted on uniflow and Schnuerle type crankcase scavenging engines. In conventional spark ignited combustion, burning is initiated at a point near the spark plug and spreads radially throughout the chamber. With TS combustion, ignition occurs nearly simultaneously at many points near the combustion chamber center, the flame front spreading rapidly in all directions. TS combustion duration is shorter than conventional, and has been studied via Schlieren photography, which showed that nuclei for TS combustion are not generated from combustion chamber wall contaminants, as with dieseling or run-on. Thus, TS combustion can easily be achieved, even with a "green" engine. Ignition is possible due to the optimal utilization of the heat at the boundary contact layer formed between residual gas and fresh mixture in the combustion chamber. It is reasonably presumed that the CHO., HO2., and O. radicals may be generated by chemical cracking of unburnt components in residual gases or the fresh mixture existing at the contact boundary with that residual gas. Concentration ratios of such radicals could not be measured, but it is significant that these three radicals serve as ignition nuclei for TS combustion The pressure at which TS combustion occurs is 82.6psi; the temperature is 580C. The temperature-combustion range, however, can be increased to include lower temperatures and pressures by increasing radical concentration.

Publ: Automotive Engineering v87 n9 p51-5 (Sep 1979)
1979
Based on SAE-790840: "A Study on Gasoline Combustion by Observation of Intermediate Reactive Products During Combustion," by Masaaki Noguchi, Yukiyasu Tanaka, Taro Tanaka, and Yukihisa Takeuchi.
Availability: See publication

HS-027 042

OFF-HIGHWAY FIRE PROTECTION: CURRENT TRENDS

Dry chemical and halon fire suppression systems for off-highway equipment are described, and consideration is given to fire detection, fire control, and fire suppression equipment. The large size of off-highway equipment aggravates the fire hazard problem by increasing the potential for fires, obstructing an operator's view of the fire, and restricting egress from a vehicle during the fire emergency. Automatic fire detection and suppression systems are available to meet various requirements of different off-highway equipment. The typical vehicle fire suppression system uses ABC, all-purpose dry chemical (monomonium phosphate). Self-cleaning nozzles have demonstrated the ability to remain clear of foreign matter that tends to obstruct discharge and change operating characteristics of a fire suppression system. A stored pressure unit has been designed with dry chemical extinguishant and propellant gas stored in the same container to prevent caking. This system can be activated by local manual control, remote manual control, an electromechanical control head, or a multiple electric device. Dry chemical systems are good when enclosure integrity is poor or nonexistent and residue is not a problem. Small pre-engineered halon systems are available when certain equipment areas are not suitable for dry chemicals (electrical equipment compartments, drag lines, shovels, and blasthole drills). These systems are pressurized with nitrogen and can be mounted vertically or horizontally to save space, using a bent siphon tube. All releasing mechanisms mentioned for dry chemical systems apply to halon systems, but instead of depressing the main check valve, the pilot check valve is opened. Fire detectors are classified according to the fire signal to which they respond (combustion particle, flame, and thermal detectors). A control unit for off-highway fire suppression equipment, developed by researchers at the Walter Kidde Company, is noted. Some types of off-highway equipment requiring different locations and types of fire suppression are identified, i.e., dozers, haulage trucks, front-end loaders, and blasthole drills.

Publ: Automotive Engineering v87 n9 p35-41 (Sep 1979)
1979
Based on SAE-790882, "Improved Fire Protection for Off-Highway Equipment," by Thomas L. deLime, 3rd. and SAE-790880, "Improved Automatic Fire Protection Systems for Off-Highway Mine Vehicles," by William H. Pomroy.
Availability: See publication

HS-027 043

DIESEL-ETHANOL FUEL BLENDS INVESTIGATED

The feasibility of blending ethanol with diesel fuel to produce "diesahol" for diesel-powered farm tractors was investigated, as one of three options for fueling farm tractor diesel engines with ethyl alcohol. The other options involved substituting alcohol for the usual diesel oil, and carbureting or injecting alcohol into the intake air to supply a certain proportion of required fuel with the remaining charge being normally injected diesel oil. In studies of premixed ethanol and diesel, farm tractors were not modified or adjusted to compensate for alcohol's presence. Laboratory and field tests were designed to determine comparative engine performance characteristics when mixtures were substituted for diesel oil. Power and fuel consumption tests were run on a 1962 Ford diesel and a 1978 John Deere diesel tractor engine, each directly connected to an electric cradled dynamometer. All diesel oil-ethanol blends caused a reduction in power for both engines compared to diesel oil alone. Principal factors limiting output as ethanol content increased were lesser amounts of energy injected per cycle due to ethanol's lower heating value and the relatively poor combustion properties of ethanol in a diesel engine. Diesel oil-ethanol blends increased fuel consumption per unit of work, delayed combustion, and increased engine noise. As the fuel's ethanol content increased, thermal efficiency of both engines increased slightly under full load conditions. At 25% load, thermal efficiency decreased rapidly with increased ethanol. Noise increased with increased ethanol content. Leakage at various fittings in the fuel system and past injector plungers increased with higher ethanol content. More bubbles were observed in the return fuel line with alcohol-bearing fuel. No quantitative engine wear data were derived. Peak cylinder pressures tended to be higher for blends than for diesel oil alone.

Publ: Automotive Engineering v87 n9 p58-61 (Sep 1979)
1979
Based on SAE-790958, "Diesel Oil and Ethanol Mixtures for Diesel-Powered Farm Tractors," by John Strait, J. J. Boedicker, and K. C. Johansen.
Availability: See publication

HS-027 044

WHAT CAUSES ENGINE AFTERRUN?

Causes of engine afterrun, or "dieseling", were studied by the Chevron Res. Corp. Afterrun is generally due to auto-ignition of the air-fuel mixture at high combustion chamber temperatures and pressures. Afterrun tendency was evaluated in a sample of 22 cars from 1972-1977 model years. Eleven cars with idle speed adjusted 200 rpm above the specified setting tended to afterrun when running on unleaded gasoline. For two cars used to determine the effect of three engine operating variables (idle speed, ignition timing, and idle mixture effects) on afterrun, idle speed was found to be the major one. Unsaturated hydrocarbons (aromatics and olefins) tended to increase afterrun severity more than saturated hydrocarbons (naphthenes and paraffins). Considering both sensitivity and aromatics, unleaded gasoline had the advantage over leaded gasoline. Retarded ignition timing and lean fuel mixtures increased afterrun, and research octane number and motor octane number affected the incidence and severity of afterrun.

Publ: Automotive Engineering v87 n9 p62-3 (Sep 1979)
1979
Based on SAE-790939, "Effect of Gasoline Octane Quality and Hydrocarbon Composition on Afterrun," by John C. Ingamells.
Availability: See publication

HS-027 045

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK

Volkswagen engineers have found that high rates of exhaust gas recirculation (EGR) can reduce diesel engine cold knock by flattening the combustion pressure gradient. EGR rates required to produce this effect vary between 25-60% of the intake gas quantity. These high rates are feasible because diesel engines run at very high equivalence ratios when idling. Tests were conducted using the diesel-powered Volkswagen Rabbit. Consideration was given to the relation between emissions, noise, heat rate, and thermodynamic conditions and cold knock, and the extent to which cold knock could be reduced by throttles alone was established. EGR clearly influenced intake air temperature before compression, the state of air and combustion chamber walls at the start of injection, and ignition delay. These influences were not relevant to diesel knock; the only important factor affecting cold knock was the introduction of exhaust gas to delay the combustion process.

Publ: Automotive Engineering v87 n9 p66-72 (Sep 1979)
1979
Based on SAE-790268, "Reducing Diesel Knock by Means of Exhaust Gas Recirculation," by H. Oetting and S. Papez.
Availability: See publication

HS-027 046

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS

Research indicates that adding colloidal graphite to engine oil yields consistent fuel efficiency improvements. In track tests conducted by Acheson Industries, three 1977 model vehicles were used to measure fuel consumption. Constant-speed fuel consumption testing involved a 1-km test run at 88.5 km/hr in each direction of the straight track section. Data were corrected to 21 degrees C ambient temperature. Two major distinctions were made among test oils: sufficient viscous differences existed among conventional multigrade oils; and there were essentially no viscous differences between comparable conventional and friction-modified oils. Except for the colloid friction modified oil, all oils were formulated with identical commercially-available components. Because conventional multigrade oils were formulated with typical additive components not known to reduce friction and without friction modifiers, they were designated nonfuel-efficient oils. Oils modified with the graphite additive were conversely designated fuel-efficient oils. Colloid friction modified oils favorably altered the boundary lubrication region of the engine cylinder wall. The piston-cylinder wall interface absorbed most (60-80%) fuel energy used in overcoming mechanical friction. At least part of this friction was viscous in the form of hydrodynamic lubrication provided by oil viscosity. Viscosity differences in conventional oils showed no consistent variations in fuel economy. The addition of one weight percent graphite in SAE 5W-30 oil gave a 6.4% improvement in fuel economy during the urban driving cycle and a 5.8% improvement during the highway driving cycle. The 5W-30 friction modified oil gave a fuel economy improvement 5.5% bette than conventional SAE 10W-40 oil.

Publ: Automotive Engineering v87 n9 p77-9 (Sep 1979)
1979
Based on SAE-780984, "Automotive Engine Friction and Fuel Efficiency--Viscous Versus Non-Viscous Effects," by Peter J. Ghirla and R. Kennedy Smith; SAE-790751, Discussions and Author Closures from the Symposium Entitled "The Relationship Between Engine Oil Viscosity and Engine Performance--Part 4," SAE-SP-434, by Ross M. Stewart and Ted W. Selby.
Availability: See publication

HS-027 047

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS

Requirements for controlling sulfur content in gasoline are examined, and treatment of fluid catalytic cracker (FCC) gasoline is discussed. The sulfur content of gasoline ranges from 30-1,000 ppm. It is a function of crude oil processed, refining configuration, and refinery operating conditions. The need to process high-sulfur crude to remove sulfur in gasoline is primarily the result of a few blend stocks. Hydrocracked gasoline is the product of a conversion process that essentially removes all sulfur. The sulfur content of FCC gasoline is a function of feed quality and FCC conversion unit operating conditions. FCC gasoline is the largest contributor of total sulfur in gasoline. Representing a large fraction of the gasoline supply, it has a sulfur content ranging from 1,000-4,000 ppm. Reduced sulfur content in FCC gasoline can be achieved by removing sulfur at the end of processing or at the FCC feed level. Hydrotreating FCC gasoline is an alternative to hydrotreating FCC feed, although the octane of FCC gasoline is substantially reduced when hydrotreated. A common way of replacing the lost octane is to reform gasoline, which converts about 10-12% of the feed into gas and hydrogen. The total process results in 5% less gasoline production. The desulfurization of light naphtha from crude distillation, at a capacity of nine million barrels per day, is estimated to cost $11 million, with operating and capital recovery costs increasing gasoline price by about 0.3 cents per gallon. Treatment of FCC gasoline should obtain a 200-ppm level of sulfur in unleaded gasoline, at a cost of $3 to $5 billion. Treatment of FCC gasoline and light naphtha should permit a 100-ppm level of sulfur in unleaded gasoline, at a cost of $4 to $6 billion.

Publ: Automotive Engineering v87 n9 p74-5 (Sep 1979)
1979
Based on SAE-790944, "Gasoline Production and Sulfur Content," by Eugene I. Motte.
Availability: See publication

HS-027 048

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT

Performance standards were developed for visibility of work zone traffic control devices, based on the general principle of driver information needs and on the specific requirement for decision sight distance. A concern among highway safety officials is that these traffic control devices are not as visible as they should be due to insufficient reflectance properties or to reduced reflectance caused by dirt. To develop performance standards, analytical exercises focused on channelization devices frequently used in work zones (drums, barricades, and panels). Existing specifications for reflectivity were reviewed, including requirements embodied the 1971 edition of the Manual on Uniform Traffic Control Devices and Federal reflectivity requirements. Information needs in work zones were evaluated, with reference to information handling zones, decision sight distance requirements for work zones (avoidance maneuver, decision and response, and detection and recognition phases), and appropriate visibility requirements for reflective devices. It is recommended that reflective devices be installed and maintained so they are visible at night under normal atmospheric conditions from a minimum distance of 900 feet (275 meters) when illuminated by standard automobile low-beam headlights.

by Hugh W. McGee; Beverly G. Knapp
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
B-4-0057
Rept. No. FHWA-RD-78-143; PB-294 781 ; 1978 ; 43p 48refs
Rept. for 28 Mar-12 Jul 1978.
Availability: NTIS

HS-027 049

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS

Performance data are summarized for lead-acid batteries and accessories, especially designed for electric vehicles operated in West Germany. Main targets of battery developments are improvements in specific stored energy, life, and cost. Comprehensive data have been obtained by VARTA Batteries Ltd. (Canada) on lead-acid batteries installed in electric vehicles. The experience of 150 electric vehicles after driving about 2.2 million miles indicates that power data on battery performance, battery maintenance reliability, and battery system safety are important in the economy of electric vehicles and in user acceptance. Special technologies such as central electrolyte refilling, forced cooling, and central venting are discussed. VARTA's accomplishments in reducing maintenance and improving reliability are noted. Improved technologies for motive power batteries are considered, as well as the development stage of VARTA's improved nickel-iron FENOX-battery.

by Uwe Werner Peters
VARTA Batteries Ltd., Canada
Rept. No. SAE-790160 ; 1979 ; 11p 6refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979
Availability: SAE

HS-027 050

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT

Exhaust emission and fuel economy measurements are detailed for a heavy-duty diesel vehicle operated over various driving cycles. Driving cycles were developed from operational data collected in New York and Los Angeles under the CAPE-21 program. In each location, data were collected and segregated for the freeway and nonfreeway operation of a 1975 model year General Motors Corp. Astro 95 tractor (cab-over-engine design with tandem rear axles and equipped with a 13-speed transmission and a 4.11 axle ratio). A data matrix relating speed, acceleration, and frequency of occurrence was prepared for each city and type of operation. The concept of chassis testing for large diesel vehicles was evaluated and exhaust emissions and fuel consumption were determined by category of operation and according to vehicle load. To verify the cycle generation technique, the sensitivity of emissions and fuel consumption to changes in driving cycles was established. The effect of linearized cycles, steady-state tests, and cold start operation was assessed. Emissions averaged 2.07 g/km for hydrocarbons, 28 g/km for carbon monoxide, and 29.2 g/km for nitrogen oxides. Fuel consumption averaged 67.7 liters/100 km. Emission levels changed with load and type of operation, but they were relatively insensitive to linearization of driving cycles and cold start operation.

Environmental Protection Agency, Emission Control Technology Div.
Rept. No. HDV-78-10; PB-293 766 ; 1978 ; 51p
Availability: NTIS

HS-027 051

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT

Results of emission tests are presented for 10 passenger cars operated on fuel blends containing methanol and ethanol. The test program was designed to determine immediate exhaust emission and fuel economy changes resulting from the use of alcohol-gasoline blends under high-altitude conditions. Vehicles representing the 1973-1978 model years were randomly selected from private owners in the Denver, Colo., area. Test procedures were the Federal Test Procedure (exhaust emissions only) and the Highway Fuel Economy Test. Exhaust emission levels for hydrocarbons, carbon monoxide, nitrogen oxides, aldehydes, and unburned alcohol were measured. Fuel economy was measured and recorded using the carbon balance technique. Four different fuels were explored: Indolene Clear and blends of Indolene Clear containing 10% ethanol, 20% ethanol, and 10% methanol. Results demonstrated significant decreases in carbon monoxide emissions and slight increases in nitrogen oxide emissions. Hydrocarbon emissions were often erratic, although average values decreased slightly with an increasing percentage of alcohol in fuel. Total aldehydes and the amount of unburned alcohol generally increased with the addition of larger amounts of alcohol. Overall, fuel economy decreased slightly. Evaporative emission test results on a single vehicle indicated that greater hot soak losses can be expected with the fuel blends.

by David Richardson
Environmental Protection Agency, Technology Assessment and Evaluation Branch, 2565 Plymouth Rd., Ann Arbor, Mich. 48105
Rept. No. TAEB-79-1; PB-290 612 ; 1978 ; 28p
Availability: NTIS

HS-027 052

EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT

A pilot test program was conducted to evaluate the effectiveness of a possible inspection and maintenance (I/M) program for passenger cars driven at high altitudes. In response to a request from the State of Colorado through the Environmental Protection Agency's Region VIII, the work was performed in 1978 by Automotive Testing Laboratories in conjunction with the fiscal year 1977 Emission Factor Passenger Car Program in Denver. Study vehicles were randomly selected from private owners in the Denver area. Included were 99 passenger cars for the 1977-1978 model years and 30 light-duty trucks for the 1975-1978 model years. Each vehicle was subjected to an underhood inspection and a series of emission tests before and after maintenance. Maintenance was performed at one of ten selected commercial repair facilities. Information on costs associated with various maintenance actions was collected. For comparison, data on 1975-1976 passenger cars that underwent restorative maintenance as part of the basic emission factor program were included. An additional fleet of 30 1975-1976 models, each having accumulated more than 50,000 odometer miles, was tested in an as-received condition only. Results confirmed the poor emission performance of relatively new in-use passenger cars, although 1977-1978 automobiles displayed better control than those for the years prior to confirmatory testing at high altitudes. High-mileage vehicles exhibited greater hydrocarbon monoxide emission levels than their low-mileage counterparts. Underhood inspections revealed that many vehicles had been subjected to various maladjustments, primarily ignition timing and idle mixture. Results of testing after maintenance at private garages showed that a reasonable I/M program at high altitudes can be effective in identifying higher emitters and in reducing hydrocarbon and carbon monoxide emissions levels.

by Thomas C. Bejma
Environmental Protection Agency, Technology Assessment and Evaluation Branch
Rept. No. TAEB-79-2; PB-290 611 ; 1978 ; 14p
Availability: NTIS

HS-027 053

EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT

The use of commercial radio as a means to communicate accurate and timely traffic information to motorists was evaluated, in order to determine whether traffic information derived from the Los Angeles Area Freeway Surveillance Control Project computer could appreciably improve the quality and quantity of commercial radio traffic advisories. It was felt that electronic surveillance could make information more timely. Evaluation results demonstrated that commercial radio can be used effectively to report major incident information in the case where incidents last longer than 15 minutes. Traffic information for incidents of 15 minutes or less proved to be untimely. Remote visual verification of incidents, e.g., by closed-circuit television, is recommended to improve the timeliness and quality of traffic advisories. Data charts are appended.

by R. Patton Thompson
California Dept. of Transportation, Business and Transportation Agency, P.O. Box 2304, Terminal Annex, Los Angeles, Calif. 90051
C-3-18
Rept. No. FHWA-RD-79-T0293; FHWA-CA-07-78-01; 07-391-623130; Freeway-Operation-Branch-75-6; PB-291 611 ; 1977 ; 42p refs
Availability: NTIS

HS-027 054

ENGINE DESIGN EXPERIENCES AND DEVELOPMENT OF CRITICAL COMPONENTS

Construction methods and technical performance developments illustrating progress in engine design since the 1940's are reviewed, with attention paid to critical engine components. Numerous engines for which the author had some personal design and/or development involvement and responsibility are described, as are predictive techniques and uses of specialized rig tests in piston assembly development to reduce development costs and time, and to improve engine reliability. Quality control techniques are briefly compared. The need for a greater degree of in-process control is stressed, to be developed during the 1980's, to attain improved quality levels with no concurrent cost increase. It is suggested that prime movers in use during the first two decades of the 21st century will still be recognizable as reciprocating engines, but that efficiencies will be improved by reduced friction and a more efficient response to engine load demand. Fuel resource conservation and the increasing demand for improvements in ecology and consumer protection are considered as they affect the demand for and recognition of engineers.

by J. E. Robinson
Publ: Proceedings of the Institution of Mechanical Engineers v193 p207-26 (Jun 1979)
1979 ; 6refs
Prepared for the Ordinary Meeting of the Automobile Div., London, 10 Apr 1979.
Availability: See publication

HS-027 055

EXHAUST TUNING

Tuning the length of exhaust systems to benefit from natural shock waves in the exhaust is considered. To understand how shock waves work to help scavenge an engine, it is necessary for one to examine what occurs inside the combustion chamber during valve overlap, when the exhaust valve has not yet closed and the intake valve has begun to open. When the exhaust valve first opens a pressure wave immediately travels through gases in the exhaust system at a speed of 18,500 inches per second. A negative shock wave is produced which travels back through outcoming exhaust gases when the shock wave gets to the pipe exit. An equation to determine appropriate exhaust length is applied in an illustration that explains how a shock wave can be used to improve gas flow throughout an engine.

by Ch. Christophe
Publ: Cycle World v18 n10 p55-7 (Oct 1979)
1979
Availability: See publication

HS-027 056

BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY

Controversy between truckers and individuals demanding safety curbs on large vehicles is explored. Accidents involving large trucks are frequent, and President Carter has asked Congress to approve emergency legislation requiring all States to allow trucks weighing up to 80,000 pounds on interstate highways in times of energy shortages. On the other side are government investigators, automobile groups, and state highway officials who claim that heavier trucks increase highway deaths and have accelerated the decay of roads. A National Hwy. Traffic Safety Administration (NHTSA) official reports that there is a high percentage of safety hazards found on inspection of large vehicles. The General Accounting Office notes that at least 22 percent of all loaded tractor-trailers exceed State weight limits. The chief engineer for the Arkansas State Hwy. and Transportation Dept. says that increasing maximum weight in his state from 73,280 to 80,000 pounds will decrease the life of interstate highways by at least 10 percent. He also states that fuel consumption is higher on poor roads and that there is more wear and tear on vehicles. The Illinois transportation secretary reports that higher weights will increase repair costs for interstate highways by $36 million between 1980-1983. Trucking firms, in arguing that critics have exaggerated overweight problems and safety hazards, say that President Carter's proposal is crucial, particularly for independent operators. The NHTSA is planning to propose a rule requiring lower underguards on the rear of truck trailers to prevent small cars from getting pinned beneath. Tougher standards for truck brakes, tires, and lighting are also being investigated. There is rising concern about truck speeds. Adequate safety rules are supported by many groups and individuals, including the American Trucking Assoc.

by Lawrence Maloney
Publ: U.S. News and World Report v87 n12 p51-3 (17 Sep 1979)
1979
Availability: See publication

HS-027 057

STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)

A simple wheel model is employed to explain basic concepts of motorcycle steering geometry. In permitting the steering axis to pass through the center of the wheel disk, steering offset (distance between the steering axis and the wheel spindle) is reduced to zero. The rake or castor angle can be reduced to zero by assuring that the steering axis is perpendicular to the surface. As the steering axis drops closer to the surface, the wheel adopts a camber or inclination away from the vertical plane. Steering offset can be minimized or maximized. Fundamental aspects of four basic parameters in motorcycle steering geometry are detailed: rake, trail, offset, and rolling radius. Consideration is given to camber thrust (way in which motorcycles corner), acceptable and unacceptable displacement (increasing the moment of inertia of the steered mass about the steering axis), and factors affecting suspension (e.g., aerodynamic or inertial loads, acceleration, and braking).

by L. J. K. Setright
Publ: Cycle Guide v13 n10 p53-60 (Oct 1979)
1979
At head of title: How Things Work.
Availability: See publication

HS-027 058

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION

This "white paper" is the result of a comprehensive evaluation of future energy resources for transportation in Michigan. Focusing on fuels, especially liquid fuels for transportation, the paper analyzes four areas of the energy dilemma: existing petroleum supplies, potential for new fuel substitutes, role of energy conservation, and economic impacts for Michigan. The study indicates that up to the year 2000 the real cost of energy will rise and its availability will decline. Net energy gains are expected to decline as well (difference between energy required to extract remaining supplies and the energy resources captured). Three basic methods for improving transportation energy efficiency include improved management of existing supplies and improved technologies, shifting a portion of travel to more energy-efficient modes, and traveling less. Alternative energy forms and automotive propulsion systems are surveyed and assessed. Probable economic impacts on Michigan are discussed, and the dual pressures of rising transport energy costs and Federal regulations on the auto industry are outlined. State action for managing Michigan's economic transition is recommended, and a mechanism for "managing change" is proposed, involving increased cooperation among Federal and state agencies.

by R. Kaufman; H. Koenig
Western Michigan Univ., Inst. of Public Affairs, Kalamazoo, Mich.; Michigan State Univ., Center for Environmental Quality, East Lansing, Mich.
Rept. No. UM-HSRI-79-13 ; 1979 ; 48p 12refs
Prepared under the Michigan Transportation Res. Prog. (Univ. of Michigan, Hwy. Safety Res. Inst.), sponsored by Michigan Dept. of Transportation.
Availability: University of Michigan, Michigan Transportation Res. Prog., Ann Arbor, Mich. 48109

HS-027 059

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT

Recent speed and accident data for Victoria, Australia, were analyzed in an attempt to evaluate the effectiveness of the mandatory 100 kph (62 mph) speed limit which was introduced in rural areas of the state in 1974. Results of analysis of rural free speed data suggest that a drop in the proportion of vehicles exceeding 100 kph occurred areawide after the introduction of the speed limit. In 1975 and 1976 the trend was towards an increase at some of the 12 measurement sites. The general trend in reported casualty accident frequencies was towards a decrease in 1974, with a subsequent increase in 1975 for both "high" (subject to mandatory speed limit) and "low" (subject to long-established lower limits) speed zones, both for state highways and roads as a whole. Although no causal link between vehicle speeds and accident occurrences can be established, the trends in speed over the 1973-1975 period are reflected in single-vehicle accident frequency trends in "high" relative to "low" speed zones. Contrary to expectation, personal injury severity (ratio of vehicle occupants killed or requiring hospitalization to occupants involved) increased in "high" speed zones over the three-year period. Increased enforcement and public education are advocated to achieve a greater speed limit compliance.

Road Safety and Traffic Authority, 801 Glenferrie Rd., Hawthorn, Vic. 3122, Australia
1978 ; 50p
Sponsored by Commonwealth Dept. of Transport (Australia). For summary report, see HS-027 060. See also HS-027 061.
Availability: Corporate author

HS-027 060

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT

Road Safety and Traffic Authority, 801 Glenferrie Rd., Hawthorn, Vic. 3122, Australia
1978 ; 23p
Sponsored by Commonwealth Dept. of Transport (Australia). For abstract, see HS-027 059. See also HS-027 061.
Availability: Corporate author

HS-027 061

EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA

Recent accident and travel data for Victoria, Australia, were analyzed to determine possible reasons for the short-term decline in motor vehicle occupant fatalities in 1974 (particularly among motor vehicle passengers and in rural areas), with particular reference to the effectiveness of the rural speed limit. A mandatory 60 mph speed limit for rural areas was introduced in the state in late 1973 (subsequently converted to 62 mph (100 kph) on 1 Jul 1974). It is concluded that the speed limit law was an important causal factor in the 1974 fatality decrease; but the subsequent increase in 1975 indicated that the legislation had short-term effectiveness only. This conclusion is not supported by available data on free speeds measured at 12 sites on rural highways; this information indicates that the significant decline in free speeds at most sites in 1974 was maintained at many of these sites in 1975, before returning to their original levels in 1976. Further analysis of accident and speed data on 100 kph highways, with the addition of 1976 data, is required to resolve the apparent conflict and to clarify the changes in rural fatality patters.

by J. E. Cowley
1977 ; 106p 11refs
Sponsored by Commonwealth Dept. of Transport (Australia) and Road Safety and Traffic Authority of Victoria. Prepared in cooperation with the Australian Bureau of Statistics (Victorian Office). See also HS-027 059 and HS-027 060.
Availability: Road Safety and Traffic Authority, 801 Glenferrie Rd., Hawthorn, Vic. 3122, Australia

HS-027 062

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL

Three papers are compiled on the subject of alcohol fuels for automotive applications. The first paper compares multicylinder spark ignition engine performance when operated on indolene, methanol, or ethanol. The second paper compares engine performance when operated on straight gasoline, methanol/gasoline blends, or ethanol/gasoline blends. The third paper discusses the effects of fuel-air ratio on fuel economy and exhaust emissions for gasoline, alcohol/gasoline, or straight alcohol operation.

Department of Energy, Div. of Transportation Energy Conservation, Washington, D.C. 20545
Rept. No. HCP/W1737-01; UC-96 ; 1978 ; 59p 12refs
Includes HS-027 063--HS-027 065.
Availability: GPO, stock no. 061-000-00074-7

HS-027 063

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL

The use of pure ethanol in conventional automotive type e gines is discussed in relation to performance and exhaust em sion results that are obtained from a reference "gasoline" a pure methanol in the same engine. The comparison was bas on all fuels operating on the same equivalence ratio. The fir ings show, in general, that ethanol gives beter fuel econor than gasoline and poorer fuel economy than methanol (on the basis of miles per million Btu). Exhaust emissions show mixed behavior. The oxides of nitrogen emission for ethanol operation was found to be between the results obtained on gasoline and methanol, i.e., higher for gasoline and lower for methanol, but closer to the gasoline results. Carbon monoxide emissions from ethanol were found to be less than the indolene and methanol results, but unburned fuel (hydrocarbons) emissions were higher from ethanol fuel in comparison to both methanol and indolene results. The maldistribution of the fuel-air mixture among the cylinders was found to be worse with ethanol when compared to gasoline, but it was better than the results obtained on methanol.

University of Santa Clara, Engineering and Applied Science
Res., Santa Clara, Calif. 95053
EC-78-C-03-1737
Publ: HS-027 062 (HCP/W1737-01), "Comparative Automotive Engine Operation When Fueled with Ethanol and Methanol," Washington, D.C., 1978 pI, I-1--I-20
1978
Availability: In HS-027 062

HS-027 064

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS

An experimental study was performed to determine the effects of substituting an alcohol-gasoline blend for gasoline on the steady-state performance and emissions characteristics of a carburetted, spark-ignited engine. Three fuels were tested: a base stock of unleaded gasoline (viz. Indolene), a 20% blend of methanol in indolene, and a 20% blend of ethanol in indolene. For fixed engine conditions (engine speed, fuel-air equivalence ratio, manifold vacuum, maximum advance for best torque), the performance and emissions characteristics during 20% ethanol blend operation were found to fall between those for the 20% methanol blend and those for pure indolene. When 20% methanol blend was compared to indolene data, it was found that engine torque was approximately 2% greater, there was at most an approximately 1.7% rise in brake thermal efficiency, carbon monoxide (CO) emissions were the same, and nitrogen oxides (NOx) and flame ionization detected (FID) hydrocarbon (HC) emissions decreased. It is concluded that for the same engine conditions, the substitution of practical levels of alcohol blends (10% to 15% by volume) will have little effect on steady-state performance and CO, FID HC, and NOx emission characteristics.

University of Miami, Dept. of Mechanical Engineering, P.O. Box 248294, Coral Gables, Fla. 33124
EY-76-S-05-5216
Publ: HS-027 062 (HCP/W1737-01), "Comparative Automotive Engine Operation When Fueled with Ethanol and Methanol," Washington, D.C., 1978 pII, II-1--II-20
1978 ; 12refs
Availability: In HS-027 062

HS-027 065

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS

The effects of variations in the fuel-air ratio (F/A) on engine performance and regulated exhaust emissions of hydrocarbons, carbon monoxide, and nitrogen oxides (NOx) are discussed for internal combustion engines operating on gasoline, alcohol/gasoline, or straight alcohol fuel. Switching from strictly petroleum-based fuels to alcohol or alcohol blends will alter the F/A in a fashion similar to that of adjusting the carburetor. On an equal equivalence ratio basis, straight alcohols will appreciably and favorably alter NOx emissions and engine thermal efficiency, compared to gasoline. With alcohol/gasoline blends, these same characteristic changes are roughly proportional to the percent alcohol content. For a 10% alcohol/90% gasoline blend, levels of regulated emissions and fuel economy are not significantly different from those of gasoline. In terms of engine operation, materials compatibility, and overall vehicle performance, the differences between ethanol and methanol are inconsequential.

by E. E. Ecklund
Department of Energy
Publ: HS-027 062 (HCP/W1737-01), "Comparative Automotive Engine Operation When Fueled with Ethanol and Methanol," Washington, D.C., 1978 pIII, III-1--III-10
1978
Availability: In HS-027 062

HS-027 066

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS

Costs for automobile ownership and operation are estimated for various income groups (U.S.) based on the types of cars owned by the families in the group, the use patterns of the cars, the average length of ownership, and the average purchase age of the cars. Costs of depreciation, maintenance, insurance, and gasoline are examined. The effects on the new car market of Federally-imposed fuel economy mandates, fuel economy taxes, and gasoline taxes are investigated with the aid of an economic model simulating the profit-maximizing behavior of the domestic auto industry. The model estimates and projects the equilibrium changes in prices, costs, sales, profits, individual and aggregate fuel economy, and governmental revenues under various levels of fuel economy mandates and taxes to be imposed for 1985. In terms of direct effects on car owners and drivers, little difference is found between the mandate and the gas guzzler tax; a 50 cent gasoline tax would more than double the impact of the mandate alone. Although the imposition of any of those policies would change driving costs by only a few percentage points or less, the merit of each policy should be determined by an evaluation of its indirect effects, implementation costs, and gasoline conservation potential.

by James P. Stucker
Rand Corp., 1700 Main St., Santa Monica, Calif. 90406
Rept. No. RAND/P-6127 ; 1978 ; 34p 16refs
Prepared for presentation at Conference of the Western Economic Assoc., Honolulu and Hilo, Hawaii, 20-26 Jun 1978.
Research sponsored by National Science Foundation, Federal Energy Administration, and Energy Res. and Devel. Agency (now Dept. of Energy).
Availability: Corporate author

HS-027 067

ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER

An automated school bus routing and scheduling system is presented which has four basic components: input, routing, scheduling, and output, in addition to the school starting and ending time component. The key aspects of the data preparation procedures are explained, including the ministop concept, a new and innovative method for network data coding. The core algorithm is explained for each component, followed by the modifications required to implement the theoretical procedure. Implementation of the procedure in two school districts has resulted in about a 20% cost savings in one and the transportation of 600 additional students with one extra bus in the second.

by Lawrence D. Bodin; Lon Berman
Publ: Transportation Science v13 n2 p113-29 (May 1979)
1979 ; 11refs
Availability: See publication

HS-027 068

A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD

A simple procedure was developed for estimating free speed distribution (speed adopted by drivers if not influenced by the presence of other vehicles) by measuring speeds of vehicles passing a point. The method can be used even when there is substantial interference between vehicles. The procedure requires identification of vehicles traveling at speeds less than their free speed. Criteria for defining such impeded vehicles are described and compared, using data from the M4 motorway (in West London, England). The estimation procedure and time headway and relative speed criteria were applied to obtain free speed frequency distributions for near- and off-side lanes of the M4 roadway. Estimates of mean free speed are compared with those obtained from a linear regression of average speed against flow. The estimation procedure is particularly suitable for application when the number of overtaking maneuvers on a road is small. For two-way roads, which usually have a number of overtaking vehicles, it can be assumed that the vehicles are queuing and can be assigned the speed of the vehicle being overtaken. The main difficulty with the estimation procedure is the necessity of defining impeded vehicles.

by David Branston
Publ: Transportation Science v13 n2 p130-45 (May 1979)
1979 ; 16refs
Sponsored by Science Res. Council (England).
Availability: See publication

HS-027 069

A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES

For the situation of driving behind a slower moving vehicle, the kinematic differences between the approaching and the following range were compiled and analyzed. Measurements of the traffic flow were carried out on a highway with two lanes in each direction. With the results of these observations and on the basis of the car following theory, a strategy was developed for distance warning indicators built into motor vehicles. An important advantage of the strategy lies in the fact that a driver is already warned at relatively great distances if he is approaching a preceding vehicle at a markedly higher speed. If he decreases his speed so that it does not differ more than 2 m/sec from that of the preceding vehicle, he can approach it (due to the less strictly conceived strategy of the following range) until he reaches the warning limit of the following range. The chosen strategy consequently prescribes an approaching speed. The effects of the warning indicators on road capacity have been calculated. For maximum traffic volume, mean distances increase while mean speeds change little (while there are no visible changes in traffic flow at lesser traffic volumes). Especially in the range of higher traffic volumes in which rear-end collisions represent the most frequent highway accident type, traffic security can be favorably influenced by distance warning indicators.

by U. Kohler
Publ: Transportation Science v13 n2 p146-62 (May 1979)
1979 ; 6refs
Research sponsored by Bundesministerium fur Forschung und Technologie (Germany).
Availability: See publication

HS-027 070

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79

Comprehensive statistical data on the U.S. motor vehicle industry documenting history and trends are tabulated and graphed. Energy, light and heavy trucks, industrial energy, emissions, safety, customer satisfaction, and government regulation are covered in an overview of the industry during the 1970's. Production and registrations statistics cover facilities of motor vehicle manufacturers, factory sales, fuel consumption, parts and accessories, production, recreational vehicles, registrations, retail sales, retirement, records, and thefts. Use and owners statistics include drivers, emissions, fleets, government ownership, highway fatalities and injuries, highways, intercity travel, ownership, personal transportation, purpose of usage, school bus transportation, shipment of goods, and vehicle miles of travel. Economic impact statistics are provided for businesses, employment, exports and imports, financing, Gross National Product contribution, Highway Trust Fund, material consumption, payrolls, personal consumption expenditures, sales, taxes, and truck sizes and weights. A subject index is provided.

Motor Vehicle Manufacturers Assoc. of the United States, Inc., Statistics Dept., 300 New Center Bldg., Detroit, Mich. 48202
1979 ; 96p refs
Availability: Corporate author $3.00

HS-027 071

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)

Test results from engine development work at BMW are presented which demonstrate the potential to improve the fuel efficiency of the internal combustion engine to make it more comparable with that of the diesel engine, especially in the lower partial load range. The need to determine the most favorable compromise among number of main crankshaft bearings, bearing size, and oil pump power required in order to reduce fuel consumption is discussed. The necessity of further reducing the dependency of oil viscosity on temperature is demonstrated. The possibility of auxiliary equipment to rapidly heat the engine and its oil and water (e.g., exhaust gas heat exchangers) is mentioned for reduced friction and increased fuel efficiency. Various options are examined for the reduction of cycle losses in the partial load range by replacement of the throttle control. Expensive equipment such as variable intake control devices show comparatively little improvement. The utilization of exhaust gas energy in complicated re-expansion procedures is not very promising. In contrast, the cylinder shutdown procedure offers considerable improvement in fuel efficiency. The unthrottled ventilation of the shutdown cylinder seems an attractive possibility because of its relatively low extra cost.

by Bertold Mayr; Reinhard Hofmann; Fritz Hartig; Knut Hockel
Publ: ATZ Automobiltechnische Zeitschrift v81 n6 p255-60 (1979)
1979 ; 21p 9refs
Translated from German (original 6p; translation 15p).
Availability: Reference copy only

HS-027 072

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES

A behavioral modeling framework is used to represent a conceptual structure of linkages among subjective factors relevant to traveler decision making. This analysis is designed to uncover factors which influence the intentions of single-occupant auto commuters to switch to buses and carpools, and to suggest operating policies consistent with encouraging the use of high-occupancy vehicles. The single-occupant auto commuters are segmented into several potential ride-sharing markets, on the basis of their expressed intention to take a bus or a carpool if certain transportation system modifications were effected. Three groups of switchers are identified: those who are positively oriented towards taking a bus, those who would only switch to a carpool, and those who would consider either of the ride-sharing modes. Bus convenience is the most important variable associated with the shift intention. Perceptions of carpool comfort do not appear to be as important as those of carpool schedule flexibility, cost, safety and a short wait in traffic. Additional models involving mode satisfaction are reviewed, and policies which enhance bus convenience and minimize waiting in traffic for carpools are suggested to recruit the potential ride-sharers.

by Mary Lynn Tischer; Ricardo Dobson
Federal Hwy. Administration, Washington, D.C. 20590; Charles River Associates, Cambridge, Mass. 02138
Publ: Transportation Research v13A (n3) p143-58 (Jun 1979)
1979 ; 28refs
Availability: See publication

HS-027 073

EVALUATING THE PERFORMANCE OF A SIMULATION MODEL (TRAFFIC ANALYSIS)

A framework is described for the examination of mathematical models, where model calibration and evaluation are based on the ability of a model to generate a set of observed outputs from a supplied set of observed inputs. With refinement and development, the framework may lead to general structures for the more rigorous evaluation of models. An application of the proposed framework to a local area traffic assignment model is described. The application facilitates the description of the framework and some of its technical components. The traffic model was tested with peak period traffic data collected in an inner suburban area of Melbourne, Australia, during 1974. On the basis of the tests conducted, this model seems a potentially useful tool for use in small-area traffic analysis. The suggested evaluation framework has its roots in previous work in the areas of transportation, hydrology and mathematical statistics. A series of levels of model evaluation is defined. For models calibrated on their ability to reproduce observed phenomena, conclusions about model usefulness and applicability need to be made with some caution. It is necessary to investigate goodness-of-fit of model outputs, and the robustness of parameter estimates, with data independent of those on which the model was calibrated. A possible scheme, known as "dual-sample testing", is outlined for this investigation. A number of possible tests of model outputs and possible systematic errors are also discussed.

by M. A. P. Taylor
Publ: Transportation Research v13A (n3) p159-73 (Jun 1979)
1979 ; 15refs
Availability: See publication

HS-027 074

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION

Analysis of Environmental Protection Agency data on 1977 model year automobiles shows that the rate of fuel consumption increases roughly linearly with car weight. This is largely the consequence of engine size, which is proportional, on the average, to the 1.8th power of the weight. Increased consumption due to larger engine size is partially offset by a specific engine efficiency that improves linearly with increasing engine size. The specific consumption, measured as gal/(cu in-lb-mi), is inversely proportional to engine displacement. It is suggested that sacrifice of body size (i.e. weight) to obtain improved overall fuel consumption is only one possible tradeoff; an alternative such as sacrifice of performance while retaining size might be more acceptable to one segment of the market.

by Robert H. Essenhigh; H. Eugene Shull; Thomas Blackadar; Herbert McKinstry
Publ: Transportation Research v13A (n3) p175-7 (Jun 1979)
1979 ; 4refs
Sponsored by Pennsylvania State Univ. Combustion Lab. Cooperative Fund.
Availability: See publication

HS-027 075

A GRAPHICAL EXPLANATION OF THE TWO PRINCIPLES AND TWO TECHNIQUES OF TRAFFIC ASSIGNMENT

The interrelationships among the average, marginal, total, and integral forms of the travel time (cost)-flow function are discussed. The choice of the appropriate form of the travel time (cost)-flow function depends on the assignment technique (heuristic loading or mathematical optimization) and the assignment principle (user-optimizing or system-optimizing) adopted for use. A table is provided as an aid for this choice. A graphical explanation is presented, based on the fundamental two-route, single-demand assignment problem, to illustrate the usefulness of the graphical approach for simple analysis of various issues related to traffic assignment. This approach has been used for the basic analysis of a combined traffic assignment/control problem. The effects of differences between perceived and actual travel times (costs) can be easily demonstrated with the aid of the fundamental diagram. The diagram can also be used for such purposes as defining an equilibrium region instead of an equilibrium point for user-optimizing assignment by developing travel time (cost) curves for each route, and for studying road pricing and toll effects.

by Rahmi Akcelik
Publ: Transportation Research v13A (n3) p179-84 (Jun 1979)
1979 ; 21refs
Availability: See publication

HS-027 076

THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO

New Mexico and other courts in the U.S. have recognized that certain situations present "exigent" circumstances which make it impracticable for law enforcement agencies to obtain warrants. With or without warrants, police officers must have probable cause to execute searches and seizures (i.e. reason to believe that the items sought are connected with criminal activity and that the items will be found in the place to be searched). In many cases where a warrantless search has taken place, the search involved a vehicle believed to contain contraband. The existence of probable cause in an emergency or exigent situation is a major exception to the warrant requirement set forth in Article II, Section 10 of the N. Mex. Constitution and the Fourth Amendment of the U.S. Constitution. In the 1977 State vs. Ruud and State vs. Galvan cases, the N. Mex. Court of Appeals took a strong position towards increasing scrutiny over police conduct in investigatory stops of automobiles. Both decisions found police officers to have acted improperly because they made stops based on a "hunch" or "intuition". In the State vs. Bidegain (1975) and State vs. Bloom (1977) cases, the N. Mex. Supreme Court reversed similar decisions by the Court of Appeals (although the decision in State vs. Bloom was based not on the propriety of police action but rather upon the power of the appellate court to review trial court findings). Although the immediate future of investigatory stops seems linked to the Galvan test, the courts may eventually begin to rely more greatly on the "field intuition" of the police officer. This poses a challenge to the protection of constitutional rights.

by Edward J. Apodaca
Publ: New Mexico Law Review v8 p223-30 (Summer 1978)
1978 ; refs
Availability: See publication

HS-027 077

EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT

The impact of the change to a modified (permissive) motorcycle helmet usage law from the mandatory usage law in Texas was evaluated in terms of motorcycle accidents, injury severity, and fatalities. Several data sources were utilized comparing pre- and post-law change periods: motorcycle accident records, medical data on motorcycle accident victims, questionnaires from motorcycle accident victims, and traffic counts. Supplemental data on vehicle registration, licensed operators, accident occurrences, injuries, and fatalities were obtained to establish trends, and information on helmet usage research in other states was studied. Analysis of the data revealed that post-law-change accident injuries had a 52% probability of being more severe than the pre-law injuries. The probability of sustaining a fatal injury was 2.5 times greater for the unhelmeted vs. the helmeted rider. The probability of fatality due to head injury was found to be 1.8 times as great for unhelmeted as for helmeted cyclists. When motorcyclists are given freedom of choice regarding helmet usage, it is found that a majority will choose not to wear a helmet.

by Myron Koehler; Curtis Goode
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
IAC-78-08-36-A-1-AA
1978 ; 105p 14refs
Sponsored by Texas Office of Traffic Safety and the National Hwy. Traffic Safety Administration.
Availability: Texas Office of Traffic Safety, Austin, Tex.

HS-027 078

FIELD TESTING A TRUCK ESCAPE RAMP

A special truck escape ramp was designed and constructed i
the Siskiyou Mountains on a section of Interstate 5 north of th
Oregon-California state line. The escape ramp is constructed o
a descending grade and is comprised of an aggregate arreste
bed, 1200 ft. long, 26 ft. wide, and 18 in. deep. It was construct
ed at the same -5.5% grade as the main line and is mostl
tangent, and to the right of the downhill shoulder. A 12-f
service lane (paved) separates the bed from the roadway shoul
der, and an oversized jersey-type concrete barrier lines the righ
edge of the bed. The entry on the uphill end and the return o
the downhill end of the arrester bed are paved. Factors leadin
to the escape ramp's development, testing procedures used fo
its evaluation, some preliminary findings on its effctiveness, in
formation on material requirements of the gravel bed, bed main
tenance procedures, and instances of actual use of the ramp ar
reported. Test results indicate that the ramp is adequate fo
vehicles and loads of the type tested (5-cu-yd trucks and
semitrailer, unloaded and loaded) entering the bed up to 8
mph, provided that the gravel bed is not frozen to a significan
depth. Tests and recent use confirm that the smooth arreste
bed can decelerate vehicles safely and without damage. Prope
signing must be provided to prevent motorists from misusing th
ramp, and to clearly identify the ramp entrance to ensure
runaway vehicle's uniform entry to the ramp.

by Jonathan Young
Federal Hwy. Administration, Oregon Div.
Publ: Highway Focus v11 n3 p43-55 (Sep 1979)
1979
Availability: See publication

HS-027 079

DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE "ACCIDENT"

The question of what constitutes an accident for the purposes c
applying the language of an insurance policy is discussed i
terms of a recent judgment by the Supreme Court of Canad
and a review of some previous Canadian lawsuits involvin
insurance companies, which illustrate various interpretations c
"accidental". The voluminous case law on the meaning of "acc
dent" had developed two important basic propositions whic
arose for discussion in the recent judgment in Mutual of Omah
Insurance Co. vs. Stats. In some of the cases, the courts entar
gled the definition of "accident" with the question of causatio
and the problem of determining "proximate cause". A numbe
of judgments had established that loss would not be "acciden
tal" when the insured had so deliberately or so recklessly ex
posed himself to the peril insured against as to be said to hav
"courted the risk". In the Stats case (1978), Evelyn Isobel Sta
was the beneficiary of $25,000 from an insurance policy held b
her sister Helen Brown. Ms. Brown died as the result of
traffic accident in which she drove across a sidewalk an
crashed into a building. An autopsy of Ms. Brown produced
blood alcohol reading of .19 and a urine alcohol reading of .2
Although judges in the case agreed that Ms. Brown was "gros
ly intoxicated" and "grossly impaired", judicial opinion wa
divided whether death resulted from "accidental bodily inju
ries". The trial judge dismissed the claim saying the death r
sulted from self-induced impairment and from Ms. Brown's d
cision to drive in a condition which she must have known wa
likely to lead to serious self-harm. Three judges of the Ontari
Court of Appeal were unanimous in allowing the appeal by th
claimant. In the Supreme Court of Canada, the insurer's appe
was dismissed by a bench of five, with one dissent.

by James A. Rendall
Publ: Manitoba Law Journal v9 p101-12 (1979)
1979 ; refs
Availability: See publication

HS-027 080

APPLICATIONS AND USE OF TRANSPORTATION DATA

Seven papers are compiled which individually cover the following aspects of transportation data collection and use: field data collection and sampling procedures for measuring regional vehicle classification and occupancy; research in the Seattle area on techniques for monitoring automobile occupancy; Georgia's evaluation of Federal Hwy. Administration procedures for estimating urban vehicle miles of travel; U.S. Census travel data for transportation planning; workplace interviews as an efficient source of travel survey data; design of small-sample home-interview travel surveys; and use of travel diaries in collecting travel data on elderly and handicapped persons.

by Mary McLaughlin, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-701 ; 1979 ; 44p refs
Includes HS-027 081--HS-027 087.
Availability: TRB $3.00

HS-027 081

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY

Small-scale field survey procedures that can be used to measure vehicle classification and occupancy at predeterined levels of statistical precision are described. Potential uses of these data to support activities related to transportation system management, air quality, energy efficiency, validation of urban transportation planning models, and trend analysis are identified. Statistical sampling plans, including plans that use the results of parallel traffic-monitoring programs, are presented to enable local planning agencies to design cost-effective field surveys. Representative values for key sampling parameters based on previous surveys, which are needed to use these sampling techniques, are provided. These procedures are then applied to a problem of survey design that demonstrates that regional occupancy can be precisely measured through the use of a small field survey. If percentage of trucks and truck travel are used, a relatively larger sample of field surveys is required to produce highly precise estimates.

by Robert A. Ferlis
Peat, Marwick, Mitchell and Co., Washington, D.C.
Publ: HS-027 080 (TRR-701), "Applications and Use of Transportation Data," Washington, D.C., 1979 p1-6
1979 ; 2refs
Prepared for 58th Annual meeting of the Transportation Res. Board. Research sponsored by Federal Hwy. Administration.
Availability: In HS-027 080

HS-027 082

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA

Vehicle-occupancy studies were conducted in the Seattle, Washington area in an effort to develop low-cost techniques for monitoring changes in vehicle occupancy that would be sensitive to variables of season, time, and commuting distance, and then to test several hypotheses relating to variations in automobile occupancy parameters. Vehicle-occupancy counts were taken at 18 sites in the Seattle region over a 15-month period, and statistical techniques for measuring car occupancy were developed. The data were snythesized by computer and anlyzed statistically to determine whether patterns existed among sites or over time or distance. No predictable patterns or trends were found in automobile occupancy by type of facility, traffic volume, level of transit service, distance to the Seattle central business district, month or season, day of week, or time of day. This finding contradicts initial hypotheses that patterns did exist that would make an abbreviated count program sufficient for measuring changes in occupancy. Variables which might hold promise for future efforts include the income level of the commuter shed for particular sites, and characteristics of ride sharers in a corridor (whether they are coworkers, kiss-and-riders, etc.). To accurately assess changing commuting patters, a long-term, continuing program should monitor carefully selected sites at regular intervals, perhaps monthly. Occupancy rates should be plotted regularly so that any variations can be seen in the context of changing external circumstances (transportation system strategies). In the Seattle area, 9 of the 18 sites have been chosen for an ongoing program.

by Martha S. Lester; James W. Dare; William T. Roach
TRANSPO Group, Bellevue, Wash.; Seattle Engineering Dept.; Seattle-King County Commuter Pool
Publ: HS-027 080 (TRR-701), "Applications and Use of Transportation Data," Washington, D.C., 1979 p7-15
1979 ; 5refs
Prepared for 58th annual meeting of the Transportation Res. Board. Data collection funds provided by Comprehensive Employment and Training Act.
Availability: In HS-027 080

HS-027 083

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL

The methodology for estimating vehicle miles of travel (VMT) was evaluated as described in the Federal Hwy. Administration's (FHWA) Guide to Urban Traffic Volume Counting. Comparisons were made, using the Savannah, Georgia, area, with the current method used by the Georgia Dept. of Transportation (GDOT) to calculate VMT. GDOT currently operates 61 continuous-count and 96 seasonal-control stations throughout the state that provide trends and factors used in expanding 24-hr coverage counts to estimates of average daily traffic. Approximately 25,000 of these counts are collected annually on all highways classed functionally above the local system. A random 5% sample of local county roads and city streets is obtained in counties scheduled for reinventory of physical road characteristics. The present study found that the FHWA research methodology cost 111.78% more than Georgia's conventional method and yielded only a 3.48% difference in the VMT estimation. The FHWA Guide approach of sampling links in various strata selected randomly to account for spatial and temporal variations, provides a uniform, systematic method for computing VMT. The temporal variation can be addressed in a less costly manner with only a minor variation in results. Factors of temporal variation are readily available from continuous-count and seasonal-control programs currently maintained in most states. It is desirable to use counting locations that are randomly selected by functional classification to allow for spatial variation in computing VMT.

by G. Jack Williams; R. Fred Fisher
Georgia Dept. of Transportation, Planning Data Services
Section, Atlanta, Ga.
Publ: HS-027 080 (TRR-701), "Applications and Use of
Transportation Data," Washington, D.C., 1979 p15-22
1979 ; 4refs
Prepared for 58th annual meeting of the Transportation Res.
Board. Sponsored by Federal Hwy. Administration.
Availability: In HS-027 080

HS-027 084

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING

The travel data to be collected during the 1980 U.S. Census of Population and Housing is restricted to commuting, which represents a minority of households' daily trip making. The journey-to-work data will include work destination, "usual" means of travel, and average travel time. Although this information, if properly collected and coded, will provide an excellent means of estimating overall commuting patterns within an urbanized area, it leaves some significant gaps in the types of work-trip data commonly used by transportation planners. Trip frequency and work schedules, believed to be essential items for all urban areas if census commuting data are to be used properly, could be obtained from a sample of employers. A survey of commuters could provide additional data that would be extremely useful in analyzing commuting patterns: alternate mode, land use at destination, and mode of access to transit. Nonwork travel data, if desired, must be obtained through locally sponsored surveys. As valuable complements to the 1980 census data, the following types of transportation facility measurements are recommended in 1980: regional vehicle travel, central-area cordon count, onboard transit survey, and parking inventory. The main opportunity presented by the census seems to be that of establishing a foundation for a continuing data base on commuting. By using the 1980 census journey-to-work data to estimate home-to-work interchanges by mode for each zone in a region, the most expensive part of such a data base can be minimized. Identifying local changes in work locations after 1980 and surveying workers at these new sites can provide an affordable method of detecting change since 1980 and updating the census data.

by Robert T. Dunphy
Metropolitan Washington Council of Governments, Office of
Technical Services
Publ: HS-027 080 (TRR-701), "Applications and Use of
Transportation Data," Washington, D.C., 1979 p22-6
1979 ; 6refs
Prepared for 58th annual meeting of the Transportation Res.
Board. Conducted as part of an Inst. of Transportation
Engineers committee report on preparation for the 1980 census.
Availability: In HS-027 080

HS-027 085

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA

Experience from two travel surveys of workers in the Washington, D.C. area conducted through the cooperation of employers indicates that this technique has some major advantages over more traditional home-based personal interviews. In addition to cost increases, other problems in personal surveys include the increased difficulty of finding adults at home and higher nonresponse rates because of privacy and security problems. With the cooperation of over 400 employers, 10,000 questionnaires were distributed to D.C. workers concerning the Metro rail rapid
transit system. The response rate compared quite favorably wit
that of personal surveys on similar subjects, and the costs wer
a mere fraction of those for a survey in person. Small businesse
and retailers showed a lower rate of cooperation in distributin
the questionnaires than other firms if there were no follow-up
Once employers received the questionnaires, the response rat
of workers in small businesses were actually much higher tha
that in larger firms. An apparently successful measure for in
creasing the response rate is to make the employer responsibl
for collecting completed questionnaires.

by Robert T. Dunphy
Metropolitan Washington Council of Governments, Office of
Technical Services
Publ: HS-027 080 (TRR-701), "Applications and Use of
Transportation Data," Washington, D.C., 1979 p26-9
1979 ; 3refs
Prepared for 58th annual meeting of the Transportation Res.
Board. Sponsored by Urban Mass Transportation
Administration.
Availability: In HS-027 080

HS-027 086

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS

The following steps in designing small-sample home-intervie
travel surveys are addressed: decide on survey purpose, decid
on variables to be measured, decide whether a home-intervie
travel survey can adequately measure the variables, determi
the coefficients of variation of the variables, decide on an acc
racy level and a confidence limit, and compute the sample siz
based on the previous two steps. Methods for using stratifie
sample frames are also discussed. The techniques are illustrat
by using composite data from several urban areas. It is show
that 900 to 1200 home interview samples are sufficient to dev
op a cross-classification model for trip generation based
automobile ownership and income, depending on whether
simple random or multistage sample is taken. It is shown th
for the purpose of travel demand forecasting, this sample size
sufficient for calibrating trip-distribution and mode-choi
models. For traffic assignment modeling, the size of the surv
is relevant only to the extent that an accurate trip table can
simulated. Computation of the required sample sizes is based
average measurements of variability taken from several are
around the country; the coefficients of variability can be co
pared to find the required sample size where the procedures
to be applied.

by Michael E. Smith
Federal Railroad Administration
Publ: HS-027 080 (TRR-701), "Applications and Use of
Transportation Data," Washington, D.C., 1979 p29-35
1979 ; 14refs
Prepared for 58th annual meeting of the Transportation Res.
Board.
Availability: In HS-027 080

HS-027 087

USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT

A survey incorporating the use of travel diaries by elderly
handicapped persons was conducted as part of an evaluation
a user-side-subsidy demonstration project to be implemented
Lawrence, Massachusetts. Before the travel diary was filled
each participant was administered a background questionna

that included questions on past travel behavior, and individual and household characteristics. The trip information requested in the diary included origin, destination, travel mode, trip purpose, and start time. From preliminary analysis of the diary data, obtained in the "before" survey, tabulations of average daily trip rate by household income and car ownership show the expected relations. Weekly tabulations show the decline in the rate of travel from the beginning to the end of the month that is typical of travel among elderly and handicapped individuals. The entire sample of travelers averaged 99 total monthly (one-way) trips with a mode of 60. An initial estimate of the standard deviation in total trips is 60, or about 60% of the mean. Only 38% of all trips were "return to home", implying that 24% of trips were links in a travel chain, and that at least 30% of all round trips had multiple destinations. Although not all respondents to the survey have joined the user-side-subsidy project, the same proportion have registered as in the population at large, or about 25%. The total cost of the diary survey was $24,000. For the 285 completed one-month diary surveys and the 315 sociodemographic and retrospective travel questionnaires, these costs represent approximately $77/usable diary and $6/usable survey questionnaire.

by J. Richard Kuzmyak; Simon Prensky
Charles River Associates; Transportation Systems Center, Cambridge, Mass.
Publ: HS-027 080 (TRR-701), "Applications and Use of Transportation Data," Washington, D.C., 1979 p36-8
1979 ; 6refs
Prepared for 58th annual meeting of the Transportation Res. Board. Sponsored by the Urban Mass Transportation Administration.
Availability: In HS-027 080

HS-027 088

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?

A new automotive turbine engine, the Kronogard Turbine/Transmission (KTT) system, differs from conventional automotive gas turbines in that it has three vs. two stages. Through an ingenious system of planetary gears, the third-stage turbine supplies auxiliary power to the turbines in the first two stages; it also drives the accessories (fuel and oil pumps, alternator, etc.) with energy that would otherwise be wasted. The ceramic turbine wheels are about 25% smaller than in other types of automotive gas turbines of similar power. Since they have less inertia, they accelerate faster; the power turbine has a maximum speed of 70,000 rpm. The third turbine and associated planetary gearing allow the KTT to achieve twice the stall torque possible with other automotive turbines. A KTT-POWERED Volvo test car drives as easily as a standard Volvo with automatic transmission, and is smoother. Starting takes 5 sec longer, but there are no cold-starting problems. No tuneups or oil changes are required. In actual road use, a Volvo with a KTT Mark I engine, running on diesel fuel, averages 20 to 24 mpg. For the Mark II, estimates run as high as 30 mpg with all-metal rotors, and up to 40 mpg with some ceramic materials in the hot-zone rotor system. Lab measurements of KTT exhaust gas show a potential for meeting the Environmental Protection Agency research goals of 0.41 g/mi hydrocarbons, 3.4 g/mi carbon monoxide, and 0.4 g/mi nitrogen oxides, as well as a future 0.2 g/mi limit on particulates. The KTT system is under development at United Turbine Co. (Malmo, Sweden), which was formed by the inventor, Prof. Sven-Olof Kronogard, in 1974, and is partly owned by Volvo.

by Jan Norbye
Publ: Popular Science v215 n4 p14, 19, 21 (Oct 1979)
1979 ; 1ref
Availability: See publication

HS-027 089

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE

Thermal management studies of the lithium-aluminum/metal sulfide battery have demonstrated the need for a lightweight, highly thermal-efficient case for electric vehicle batteries. Proposed conceptual designs for the battery case employ vacuum-foil insulation and meet design requirements determined in the management studies. A preliminary comparison of cylindrical vs. rectangular configuration for a 50 kW-hr battery showed significant advantage for the former, provided that cells can be so configured without significantly impacting cell manufacturing cost or performance. Thermal analysis calculations, which have been completely based on the rectangularly-configured Mark IA battery, indicate that the heat loss goal of 400 W should be easily met. The calculated value of 283 W suggests that, with further design refinements, the goal of 150 W heat loss for the 50 kW-hr Mark II battery is attainable. Experiments directed at determining the reversible (TdeltaS) heating experienced by cells during electrical cycling showed an average value of 0.104 W/A which compares well with a calculated value of 0.112 W/A based on theoretical considerations. Mark II battery calculations indicate that using the thermal storage capacity of the battery between 420 degrees C and 450 degrees C permits a duty cycle based on 10,000 mi/yr, requiring essentially no additional energy to keep the battery hot.

by M. M. Farahat; J. A. E. Graae; A. A. Chilenskas; D. L. Barney
Argonne National Lab., Chemical Engineering Div.
Rept. No. SAE-790161 ; 1979 ; 8p 3refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 090

MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS

Alloy selection and/or geometrical design guidelines that lead to least-weight aluminum body panels for automobiles are described. Performance criteria influencing inner and outer body panel geometry and thickness include denting, local stiffness (oil-canning of outer panel), torsional/bending stiffness, strength, and vibration. The use of high-strength alloys provides the least panel weight when the governing criteria are denting, permanent set, and crippling. Redesign to change panel span or rib size and shape provides the least weight when the governing criterion is stiffness. Any performance criterion can control design. For example, a plot of an aluminum assembly's relative weight as a function of yield strength shows that the highest relative weight occurs when stiffness governs design, and that the least weight occurs if design is limited by denting. Designers should use high-strength alloys to their fullest strength levels for minimum weight so that dent resistance and/or permanent set are the controlling performance criteria.

by R. L. Rolf; M. L. Sharp; W. C. Herbein
Aluminum Co. of America, Alcoa Technical Center
Rept. No. SAE-790164 ; 1979 ; 12p 12refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 091

A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN

This high-energy lead-acid battery was developed to provide, at no extra cost, an 1,800-kg (4000 lb) payload electric delivery van with a driving range of 80-90 km (50-55 miles). A prototype vehicle designated the Dodge Silent Karrier Mark 1 was constructed in 1975. Technological advances in tubular plate manufacture made thin plate batteries viable. Thin plate technology was the essential precursor to the long-life, high-energy, motive power battery needed to provide credibility to the electric vehicle program. Battery specifications, cell development goals, and system parameters were established. In addition to high-performance electrodes, an integrated approach to the total power source concept evolved lightweight designs for battery packaging, a system-engineered battery charger, and an automatic topping-up facility. Despite the 40% improvement in range compared with 55-65 km (35-40 miles) for conventional traction batteries, a 4-year battery life can be reasonably expected due to reinforcing features of the tubular design adopted for positive electrodes.

by Michael L. Whitehead
Chloride Technical Ltd., United Kingdom
Rept. No. SAE-790162 ; 1979 ; 11p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 092

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS

The reaction injection molding (RIM) process is used extensively for the production of soft urethane bumper fascias and offers many advantages compared to other polymer processes. The concept of adding fiber reinforcement to a urethane substrate has resulted in significant improvements relative to stiffness and dimensional integrity while maintaining a low specific gravity. With the proper combination of reinforcement and urethane chemistry, a damage-resistant material suitable for automotive body panel applications can be expected. An investigation of reinforced reaction injection molding (RRIM) equipment and material is underway at General Motors. A description of the RIM process is given, various reinforcement particles described, and the equipment and procedure distinctions of the RRIM process are detailed. Consideration is given to length and loading limitations, equipment wear and durability, bulk handling and blending equipment, and physical properties of the RRIM product. Areas needing further development are examined, and potential automotive applications based on the RRIM process are discussed.

by David L. Simpkins
General Motors Mfg. Devel., Warren, Mich.
Rept. No. SAE-790165 ; 1979 ; 11p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 093

CONTROLLING THE PHYSICAL PROPERTIES OI RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT

Work done since June 1977 at the Goodyear Tire and Rub
Co. demonstrates that physical properties of reaction inject
molding (RIM) compounds can be modified to meet cert
requirements by the selection of reinforcement type and conc
tration. The use of RIM materials in exterior automotive s
tions has limited application due to the high coefficient of lin
thermal expansion (CLTE), and poor heat resistance. Incorpo
tion of a reinforcing agent in RIM material (reinforced react
injection molding or RRIM) improves these properties wh
retaining the excellent processing qualities of RIM. The RR
process follows the pattern of the standard RIM process, i
high-pressure metering and impingement mixing. Due to
abrasive nature of high-viscosity glass-filled RRIM compone
certain machine modifications are required. The Cincinnati
lacron LRM-G machine used in Goodyear's work incorpora
the following features to permit the use of reinforcements: c
tinual low-pressure recirculation through the mix head; Lan
type cylinders; reinforcements added to both streams; and
heads built from hardened materials. Experiments indicate t
the addition of milled fiberglass or mica flake reinforceme
results in increased flexural modulus, decreased CLTE,
creased elongation, and decreased impact strength. Milled
berglass orients into the mold during injection, causing aniso
pic behavior in physical properties. Mica flake reinforced ure
anes do not exhibit orientation effects found with milled fibe
lass, but mica flake causes a greater reduction in elongation
impact than milled fiberglass. Several urethane systems are c
sidered, and general effects of mica flake or milled fiberglass
found to be reasonably independent of the base urethane syst

by C. J. MacGregor; R. A. Parker
Goodyear Tire and Rubber Co., Logan, Ohio
Rept. No. SAE-790166 ; 1979 ; 10p 3refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 094

HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS

The overall suitability of various sheet steels (strain-aging st
such as capped nitrogenized and rephosphorized steels
killed rephosphorized and microalloyed steels) for automo
body panel applications is assessed by comparing their resp
tive characteristics for formability, weldability, and paintabil
Steel sheet formability is perhaps the most important requ
ment for body panel applications. To minimize the loss of
mability that occurs as strength is increased, steels having y
strengths of 40-50 ksi are considered primary candidates for
in body panels. Of the different types of 40-50 ksi steels
viewed, killed rephosphorized steels (especially a silicon-c
taining version) show the best combination of formability
weldability. Although some difficulty in meeting paint and
formance requirements has been reported with these steels, a
tional study is needed to identify factors affecting paintability
killed rephosphorized steels. The application of cold-rolled d
phase steels is discussed, along with material requirements
body panels.

by S. R. Goodman; P. R. Mould
United States Steel Corp., Res. Lab., Monroeville, Pa.
Rept. No. SAE-790168 ; 1979 ; 18p 18refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 095

REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY

The feasibility of using plastics as a metal substitute on vehicle bodies and parts to minimize weight is explored. The situation in Europe is detailed, particularly the chances for fiberglass-reinforced polyester. Automobile material selection is affected by the oil crisis, the shortage of raw materials, and energy-saving and anti-rust legislation. Factors of value maintenance, recycling, and environmental protection are important, and plastics have good prospects in this regard. Thermoplastic materials should be considered for parts such as doors, hoods, trunk lids, and removable roofs. Reinforced polyester shows the most potential, but four considerations must be taken into account. The peculiarities of the vehicle manufacturing industry include the need for sufficient lead time in development of vehicle prototypes, the need to retool plants, and the need to coordinate development with allied industries. The political significance of the decision to use reinforced polyester on a large scale, will affect many aspects of vehicle safety legislation. Collaboration among raw material producers, paint manufacturers, machine developers, and assembly and transport specialists must be coordinated. Finally, the effect of reinforced polyester use on the labor force and the economy must be assessed.

by Herman Hablitzel
Volkswagenwerk AG, Wolfsburg, Germany
Rept. No. SAE-790169 ; 1979 ; 16p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 096

INNOVATIVE SHEET MOLDING COMPOUND PROCESSES

The contribution of lightweight sheet molding compound (SMC) to vehicle weight reduction in accordance with the Federal mandate for gas mileage is evaluated. For SMC to be competitive with other improved lightweight materials, several changes in the quality and productivity of the standard compression molding process must occur. At General Motors Mfg. Devel., the objective of the Plastics Process Devel. Dept. is to improve this process. Work covers updating the programmable force velocity control system, the molded coating system, and mold heat transfer analysis. A Class "A" surface SMC product with less finishing operations can be achieved with molded coating. Heat transfer analysis will shorten the cycle time and eliminate part warping by uniform curing. A more consistent and/or advanced SMC composite can be attained with the SMC equipment mix room/inline system and advanced SMC machine. The advanced compression mold transfer line will permit high productivity of a given SMC part. Concepts to be investigated in further work focus on SMC equipment and an advanced compression mold transfer line.

by Geary Y. Yee
General Motors Corp. Plastics Process Devel. Dept.
Rept. No. SAE-790170 ; 1979 ; 12p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 097

A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)

Factors affecting the control of nitrogen oxide emissions are addressed, with reference to fuel economy and drivability. Most studies question or deny the ability to design and develop a system that will maintain 0.4 grams of nitrogen oxides per mile. A careful review of factors affecting emissions and fuel economy and available control systems, however, suggests that the 0.4-gram objective may not only be achieved but exceeded. Advanced sensing, control, and exhaust after-treatment may achieve superior performance without sacrificing fuel economy and drivability. Vehicle downsizing and sophisticated system control concepts may retain achievements despite more stringent fuel economy standards. The real challenge for a fuel control system occurs during transient operating conditions. Testing with a 4,500-lb 1978 Cadillac, having a factory-installed electronic fuel injection system modified to operate in the sequential injection mode, indicates emissions improvements of hydrocarbon (28%), carbon monoxide (43%), nitrogen oxides (17%), fuel economy improvements of 5.5%-7.5%, and excellent drivability. It is anticipated that the development of a closed-loop fuel control system with the ability to adjust adaptively to changing environment, plant, and hardware conditions will result in even better emission control.

by Robert H. Parker
Bendix Electronics and Engine Control Systems Group
Rept. No. SAE-790175 ; 1979 ; 11p 5refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 098

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS

A fuel modulation attenuation model for single-point closed-loop fuel metering systems is presented. The model calculates the attenuation of a metered air-fuel perturbation and the time delay in the transport of perturbed signals from the metering point through the engine to the exhaust system as a function of modulation frequency, engine RPM, intake manifold vacuum, and exhaust gas recirculation. Results for a V-8 engine with sine wave, triangular wave, and square wave modulations show that attenuation for the triangular wave is highest, and for the square wave is smallest. In general, attenuation increases with increasing modulation frequency and increasing exhaust gas recirculation, but decreases with increasing RPM. The model can be extended to study the attenuation and transport delay of other engines and wave forms. Sine wave modulation equations are appended.

by Hai Wu; Paul N. Blumberg
Ford Motor Co., Engineering and Res. Staff, Dearborn, Mich.
Rept. No. SAE-790172 ; 1979 ; 14p 10refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 099

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT

Equipment needs of reduced visibility guidance (RVG) systems were evaluated in this 1977 survey that covered five equipment categories (fog sensors and monitors, vehicle sensors, signing, reduced visibility guidance and delineation, and communication equipment). The goal was to determine what system design factors contribute to system effectiveness and what approach is economically feasible for specific highway conditions. Data were collected and analyzed for seven reduced visibility systems. A utility-cost model was generated to allow quantitative comparisons. A measure of need index was also derived to make comparisons between hazard seriousness levels at different locations. Information was provided by equipment manufacturers and distributors; additional data were obtained through a literature review and contacts with principal equipment users and researchers in the field. The survey resulted in a methodology which allows reduced visibility problems to be quantified and permits resources to be allocated in a systematic way proportionate to hazard seriousness.

by J. Petrykanyn; W. Heiss; J. Winokur; F. Soccoli
Sperry Rand Corp., Sperry Systems Management, Great Neck, N.Y. 11020
DOT-FH-11-9189
Rept. No. FHWA-RD-78-116; GF-3704-1052 ; 1979 ; 145p refs
Vol. 1 is HS-027 149; Implementation Package 79-2, User Guidelines For Reduced Visibility System Design, is HS-027 146.
Availability: NTIS

HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT

Significant data, procedures, and criteria for consideration in the planning and evaluation of comprehensive pedestrian systems and individual facilities are identified. This manual is operational and sequential in nature, with procedures grouped according to two major phases: the demand modeling phase, where existing and projected pedestrian movement is examined using a gravity model approach to produce a network plan that shows the assignment of pedestrian volumes; and the network evaluation phase, where the first phase output is utilized to develop a plan that addresses specific planning aspects of a pedestrian system and modal interface requirements. Methods are incorporated for examining and evaluating system effectiveness and potential impact. The need for a pedestrian planning process, the pedestrian planning context, and application of the pedestrian planning process according to a step-task approach are reviewed. Tables, figures, and mathematical equations are included.

by L. S. Kagan; W. G. Scott; U. P. Avin
RTKL Associates Inc., The Village Square, Village of Cross Keys, Baltimore, Md. 21210; Kilkeary, Scott and Associates, Inc., 509 Powell Dr., Annapolis, Md. 21401
DOT-FH-11-8816
Rept. No. FHWA-RD-79-46 ; 1978 ; 340p refs
Rept for Jun 1975-Nov 1978. Vol. 1, is HS-027 008; Vol. 3, is HS-027 101.
Availability: NTIS

HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT

Significant data, procedures, and criteria for consideration in
planning and evaluation of comprehensive pedestrian syst
and individual facilities are identified. The derivation of
provided in the procedures volume is explained. Detailed d
methodologies, and worked examples are presented as sup
mental information to facilitate the understanding of procedu
Emphasis is on the pedestrian planning process as a way
improve the planning, design, and evaluation of pedestrian
tems. Components of a pedestrian system are identified (pe
trian, pedestrian environment, and other urban systems). Ta
figures, and mathematical equations are included.

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DOT-FH-11-8816
Rept. No. FHWA-RD-79-47 ; 1978 ; 377p refs
Rept. for Jun 1975-Nov 1978. Vol. 1, is HS-027 008; Vol. 2,
HS-027 100.
Availability: NTIS

HS-027 102

PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT

Criteria, warrants, and traffic control devices are suggested
use in designing safe passing operations and designating
passing zones on rural two-lane highways. Criteria are base
vehicle performance during the passing maneuver, on the p
ise that sight distance should be provided at the critical pos
when passing and passed vehicles are abreast, and on evalu
of traffic control devices in providing required visual info
tion at this critical position. Minimum passing sight distan
defined as the sight distance necessary at the critical positio
permit a passing driver to perceive an opposing vehicle in
to complete the passing maneuver safely. An advance pave
marking system comprised of a short dotted yellow line
cent to the roadway centerline throughout the pass compl
distance is proposed, in conjunction with a no-passing
pennant sign, to advise the passing driver that beyond that
there is not sufficient distance to complete the maneuver b
reaching the no-passing zone. Warrants for no-passing zone
presented, with lengths of advance treatment and minimum
tances between successive no-passing zones for a range o
pected operating speeds. An economic analysis of nation
system implementation indicates a high probability of cost-
tiveness. Use of the single solid yellow centerline on rural
lane highways to designate restrictive passing zones is eva
ed, based on driver understanding tests, accident rate com
son, and opinions of personnel from various fields (enginee
enforcement, and legal) regarding expected safety and co
ance problems.

by Graeme D. Weaver; Donal L. Woods
Texas Transportation Inst., Texas A and M Univ., College Station, Tex. 77843
DOT-FH-11-9164
Rept. No. FHWA-RD-79-5; RF-3453-1 ; 1978 ; 242p 61refs
Rept. for Oct 1976-Sep 1978.
Availability: NTIS

HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4

Data on 236 accidents involving pedestrians struck on limited access highways in California, Michigan, Missouri, North Carolina, and Pennsylvania were collected and analyzed. The data included behavioral sequence items, accident location characteristics, identification items, pedestrian factors, driver factors, and vehicle factors. Accident investigations were intended to identify precipitating and predisposing factors in each accident. Data reduction and analysis resulted in the identification of characteristic accident situations or types. Although 14 different accident types were observed, the most frequent types accounted for nearly 60% of accidents (disabled vehicle, result of auto-auto crash, unusual circumstances, hitchhiking, interchange dash, and walking to or from disabled vehicle). The relatively infrequent occurrence of pedestrian accidents on freeways, less than 1,000 annually nationwide, and varied causal factors involved such as suicide, alcohol, poor weather, and disabled vehicles, suggest that countermeasure implementation be carefully considered on a site-by-site basis. Countermeasures intended to minimize each accident type are discussed.

by R. L. Knoblauch; W. Moore, Jr.; P. R. Schmitz
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
DOT-HS-355-3-718
Rept. No. FHWA-RD-78-170 ; 1978 ; 233p refs
Rept. for Nov 1974-Apr 1976. Vol. 1, is HS-027 135; Vol. 3, is HS-027 136. See also HS-802 266, (Phases 1 and 2).
Availability: NTIS

HS-027 104

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE

Activities of the Environmental Protection Agency (EPA) in carrying out the Noise Control Act of 1972 and the Quiet Communities Act of 1978 are reviewed. Under the Noise Control Act, EPA was mandated to identify and regulate major sources of noise, propose aircraft noise standards to the Federal Aviation Administration, label noisy products, engage in research technical assistance and public information dissemination, and coordinate Federal noise control efforts. The Quiet Communities Act significantly increased EPA'S role in helping States and localities to establish noise control programs and in providing the public with information about the harmful effects of noise. EPA is developing noise abatement plans for various modes of surface transportation (highway and rail) and the areas they affect. Noise emission standards and regulations have been established for wheel and crawler tractors (construction equipment), truck-mounted solid waste compactors (garbage trucks), motorcycles and motorcycle replacement exhaust systems, buses, truck-transport refrigeration units, power lawn mowers, and pavement breakers and rock drills. Federal noise program coordination is discussed. Special EPA projects and studies are noted, and a publications list is included.

Environmental Protection Agency, Washington, D.C. 20460
1979 ; 50p refs
Availability: Corporate author

HS-027 114

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977

In late 1973 and early 1974, the gasoline shortage led to a 55-mph national maximum speed limit. There was an immediate decrease in motor vehicle fatalities, as the National Safety Council (NSC) had predicted before the law went into effect, that lasted beyond the shortage period. NSC studies in 1975 disclosed that the 55-mph law acted as a catalyst and helped produce general reductions in speed on low-speed and high-speed roads. Reduced speed accounted for approximately 50% of the reduction in fatalities during 1973-1974. In 1977, four years after the 55-mph law, reduced speed was still a major factor in keeping the death total low. Factors contributing to the decreased death total were long-term trends in the mileage death rate, reduced speed and narrower speed distribution, extra use of interstate highways, and reduced average occupancy (fewer people at risk). Factors serving to increase the death total were changes in motorcycle use, changes in the age distribution of drivers, and increased use of small cars. Overall, 12,600 lives were saved from 1973-1977 with introduction of the 55-mph speed limit. Savings were also realized in gasoline consumption.

National Safety Council, Statistics Dept., 444 N. Michigan Ave., Chicago, Ill. 60611
1979 ; 16p 5refs
Availability: Corporate author

HS-027 115

DRINKING AND DRIVING ACCIDENTS--DOES EDUCATION HELP?

The contribution of problem drinkers to road accidents is considered, and the role of publicity and education in minimizing drinking-related accidents and in maximizing law enforcement is explored. In England, persons with very high blood alcohol concentrations who are involved in accidents and repeat offenders cannot have their drivers' licenses restored until they satisfy the courts that they have reformed their behavior. The worst accidents dealt with by a typical London casualty department are caused by people returning from parties late at night who drive at high speeds. Drinking and driving legislation passed in 1967 by England's Department of Transport was accompanied by massive publicity. Attempts were made to encourage public awareness, but there is no evidence of an impact on accident rates. Fear of detection is the best deterrent, particularly when people realize there is a genuine chance of a breath test. Publicity and education are essential in making people aware of alcohol's effects on driving. Without more accurate knowledge of attitudes, however, publicity and education may not be effective. Attitudes can be evaluated in roadside surveys. The importance of education, especially by road safety officials and physicians who see the results of road accidents after drinking, is stressed.

Publ: British Medical Journal v2 p1352-4 (11 Nov 1978)
1978 ; 11refs
At head of title: "A Modern Epidemic."
Availability: See publication

HS-027 116

HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK

Factors to consider in the purchase of powered manlift or aerial devices for utility trucks are described. Aerial devices vary in cost, complexity and size from a simple truck-mounted ladder to 150-foot devices mounted on crane carrier chassis. Considerations pertinent to aerial device purchase are height of work to be performed, insulation, load to be lifted, required side reach, travel height, number and span of outriggers, and whether the unit should articulate fully, be overcenter, non-overcenter, or a telescoping boom. Ease of maintenance is also a consideration. Articulated units often give a better choice of working positions and facilitate field side work. Telescoping units are generally preferred when working through heavy trees. The purchase of a device larger than required can waste capital, both in the device itself and in the chassis required to mount the device. Purchasers should be aware of Federal (Occupational Safety and Health Administration), state, and local standards applicable to aerial devices, as well as standards promulgated by the American National Standards Inst.

by Weston R. Poyner
A. B. Chance Co., Cranes Pitman Div.
Rept. No. SAE-790155 ; 1979 ; 8p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 117

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT

The computer simulation of a battery-powered bus as it traverses an arbitrary mission profile of specified acceleration, roadway grade, and headwind is described. Battery-bus system components include a DC shunt motor, a solid-state power conditioning unit with regeneration capability, and a battery source consisting of a multi-unit lead acid battery. The computer model determines vehicle tractive effort and power consumption and computes actual vehicle speed for a given mission profile. Program output data are tabulated in a form permitting easy recognition of various operational modes and power-limited regimes. The computer model uses a modularization format which facilitates the simulation of alternative propulsion systems involving the interchange of one system component for another. The model is applied to simulate propulsion characteristics of a typical bus operating over a specified drive cycle. Results demonstrate the applicability of the battery-bus model for predicting bus propulsion characteristics under simulated drive conditions. A glossary of program constants and variables is appended.

by John J. Stickler
Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142
Rept. No. UMTA-MA-06-0093-79-1; DOT-TSC-UMTA-79-15 ; 1979 ; 90p 2refs
Rept. for Jun-Dec 1978.
Availability: NTIS

HS-027 118

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT

Flywheel energy storage systems have been proposed as a means of reducing energy requirements of fixed-route, multistop, urban transit vehicles. A study was conducted to assess lif cycle costs and potential applications of these vehicles in urba transit operations. Two conventional concepts (diesel and tro ley buses) and three flywheel vehicle concepts (all flywhee flywheel/diesel, and flywheel/battery buses) were compared. present worth costing procedure was used to express life cycl costs of each vehicle system in equivalent 1977 dollars. Wit this technique, the present value life cycle cost was determine by discounting all expected fixed capital and annual recurrin operations and maintenance costs over the investment perio Energy consumption, potential demand, and market applicatio were evaluated. Present value costs per vehicle mile for trolle and all flywheel vehicles were inversely related to assume vehicle density on the route. Per vehicle mile costs of dies flywheel/diesel, and flywheel/battery vehicles were not affecte by changes in vehicle headway. The flywheel/diesel vehic offered an 8% energy savings over the baseline diesel bus, whi the all flywheel vehicle offered a 22% energy savings over t trolley bus. The flywheel/battery bus was a highly energ intensive vehicle, consuming nearly 31% more energy per vel cle mile operated that the trolley bus. A market share of 10 30% of the total new bus demand was projected for flywhe powered vehicle systems in the 1980-1990 period. Appended additional information on life cycle cost analysis (analysis mod and system operation equations; recent bid prices and age dist bution of diesel and trolley buses; cost estimates for overhe trolley power line and distribution system, and for flywhe propulsion units).

by D. L. Goeddel; G. Ploetz
Research and Special Programs Administration, Transportatio Systems Center, Cambridge, Mass. 02142
Rept. No. UTMA-MA-06-0044-78-2; DOT-TSC-UMTA-78-77 1979 ; 190p 26refs
Rept. for Fall 1977-Summer 1978. Sponsored by Urban Mass Transportation Administration.
Availability: NTIS

HS-027 119

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT

Highway advisory radio (HAR) activities, commercially ava ble hardware, and U.S. licensing requirements are summari The HAR uses the AM radio receiver in a vehicle to con information to the driver about hazardous road conditions, t fic congestion, alternate routing, off-road services, and tou attraction. Data on HAR equipment were obtained from ma facturer catalogs, measurements made at operational sites, laboratory testing. The review covers HAR system surveilla advance signing, and broadcasting equipment. Commerci available HAR transmitters, modulating sources (tape recor equipment), and antenna types are cataloged. Federal Comm cations Commission (FCC) rulemaking is examined in relatio HAR applications and authorization requirements as well HAR frequencies, conditions, limitations, and technical st ards. Appended are recommended HAR advance visual sign excerpts from FCC regulations, an Illinois application fo Travelers Information Station, and a glossary of tape recor terms.

by Warren F. Dorsey
Federal Hwy. Administration, Traffic Systems Div., Washington, D.C. 20590
Rept. No. FHWA-RD-79-87 ; 1979 ; 129p 29refs
Rept. for Oct 1977-Apr 1979.
Availability: NTIS

HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT

by W. L. Gramling; J. G. Hopkins, 3rd.; G. Cumberledge; A. Bhajandas; R. M. Nicotera
Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120
DOT-FH-11-9161
Rept. No. FHWA-RD-79-67; RP-76-18 ; 1978 ; 17p 1ref
For abstract, see HS-027 121.
Availability: NTIS

HS-027 121

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT

A field review of pavement evaluation practices was conducted in 11 states (Calfornia, Florida, Georgia, Kentucky, Nebraska, Pennsylvania, Texas, Utah, Virginia, Washington, and Wisconsin). Each state had implemented in one form or another a program using measurements and evaluation of pavement characteristics as a basis for scheduling maintenance and rehabilitation. Data collected during the state visits, supplemented with a literature review and a limited, firsthand review of equipment in use, were used to develop recommended measurements, measurement procedures, and equipment for a complete pavement condition survey. Recommended data processing, storage, and retrieval procedures were also developed. The measurements needed for pavement condition evaluation are skid resistance, roughness, structural capacity, and distress. Appended are guidelines for discussing pavement condition measurement needs and methods with state transportation departments; an overview of state visits; summary tabulation by state of skid system features, components, and operations; test methods for roughness and deflection; data handling approach for pavement management; list of recommended equipment manufacturers; and estimated cost per mile for pavement condition measurements.

by W. L. Gramling; J. G. Hopkins, 3rd.; G. Cumberledge; A. Bhajandas; R. M. Nicotera
Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120
DOT-FH-11-9161
Rept. No. FHWA-RD-79-68; RP-76-18 ; 1978 ; 126p 45refs
For summary report, see HS-027 120.
Availability: NTIS

HS-027 122

DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)

The design of a linear step actuator is described for an automotive application requiring a step of .1 mm for each input of DC voltage to the actuator with a total travel of 13.2 mm or 125 steps of input power. This performance was required over the usual voltage range of 9 to 15 volts, at a stepping rate from 0 to 160 steps per sec, and over an operating temperature range of -40 degrees C to plus 110 degrees C. The mechanical considerations were that the unit was to screw into a threaded hole and to mate with an electrical connection plug. A motor of the type selected for this application has been used in AC synchronous devices called synchronous inductor motors. The motor had about 6.5 nt mm of holding torque, thus giving about 4.4 nt mm of max stepping output torque.

by James R. Crawshaw
TRW, Globe Motors Div., Dayton, Ohio
Rept. No. SAE-790121 ; 1979 ; 7p 3refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 123

AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES

Structural bonding of reinforced plastics has been utilized for more than ten years in a variety of automotive applications (e.g. truck front-end assemblies, pickup box covers, utility vehicle tops), usually involving manual application of the adhesive. With the emerging interest in high-volume production of lightweight parts, new materials with higher strength are being used (e.g. graphite, high-glass, and oriented-glass systems). Newly developed uses for reinforced plastics are radiator supports, bumpers, frame cross members, doors, truck tailgates, station wagon lift gates, and truck cabs. These new applications necessitate improvements and simplification of the adhesive bonding system as well as improvement and automation of the application equipment. Some recent developments along these lines include the Goodyear Pliogrip adhesive system, Liquid Controls meter mixing equipment, and automated, three-dimensional, programmed robot equipment made by Robotics, Inc. Automated structural bonding will be most successful if the manufacturer, adhesive supplier, and equipment suppliers work as a team on a systems approach.

by William R. Schmitz; Thomas G. Rabito
Goodyear Tire and Rubber Co., Adhesive Div., Ashland, Ohio
Rept. No. SAE-790150 ; 1979 ; 4p
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 124

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL

The software engineer's tools and techniques for electronic engine control strategy software development are outlined. Typical debugging techniques (the assembler program and "walk through" debugging) are mentioned. Discussed in more detail are several approaches to software design verification, each providing an additional degree of confidence with a corresponding level of effort. These techniques include emulation, time-shared simulation-emulation comparison, bench testing, vehicle testing, and computerized real-time software design verification (SDV). Primary attention is given to the time-based stimulus generation, the real-time performance measurements, time-based tolerance generation, and data reduction of a real-time SDV test system. It is highly recommended that all high-volume computer-based control systems include a real-time SDV.

by Charles D. Durrett, Jr.
Ford Motor Co., Allen Park, Mich.
Rept. No. SAE-790174 ; 1979 ; 12p 2refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 125

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES

In order to determine the optimal calibration of electronic engine control systems for minimal fuel consumption and compliance with emission control standards, the disadvantage function technique was developed. Given pollutant limits, a target fuel consumption rate, the driving schedule as represented by a mini-map (a data set derived from steady-state testing at a small number of representative speed/torque points over a range of control strategies), a set of advantage and disadvantage coefficients, and an engine data base, the computer program computes an allocation of pollutants and corresponding disadvantage functions. All control conditions for a given mini-map point are ranked in order of increasing disadvantage function. The program computes the total emissions and fuel consumption for the set of "best" control conditions, given the coefficients. Through an iterative procedure, interacting with the program, the engineer arrives at a near-optimum balance. The disadvantage function technique is described, illustrated by an example, and compared with well-known optimization methods.

by Alfred B. Bortz
United Technologies, Essex Group
Rept. No. SAE-790176 ; 1979 ; 8p 7refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 126

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING

A procedure is introduced for establishing optimum engine performance in terms of fuel economy and exhaust emission constraints as a function of spark advance, exhaust gas recirculation, and air-fuel ratio. The procedure is based on mathematical engine models that have been validated over a driving cycle on an engine dynamometer. It is based on solving a nonlinear programming problem with equality and inequality constraints. The results of the optimization are used to develop control calibrations that can be implemented on a vehicle. Results are presented of applying the optimal control procedure to models of a fuel-injected, spark-ignited V-8 engine under warmed-up operating conditions, assuming constant efficiency of the catalytic coverter. Vehicle validation of these results has yet to be demonstrated.

by Harish S. Rao; A. I. Cohen; J. A. Tennant; K. L. Van Voorhies
Systems Control Inc.; General Motors Corp., Engineering Staff
Rept. No. SAE-790177 ; 1979 ; 14p 15refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 127

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES

U.S. highways are deteriorating at an accelerated rate and sufficient funds are not available to meet current needs or future requirements for repair. Excessive truck weight is a major cause of highway damage. The rate of highway deterioration will slow down if excessively heavy trucks are kept off the highways. Federal weight limits and monitoring of state weight enforcement programs are inadequate to protect the $96 billion Federal highway investment made since 1956. The Congress should amend highway legislation to apply Federal weight limits to all Federal-aid highways and to prohibit issuance of overweight permits and exemptions when loads can be reduced to meet normal state weight limits. National statistics show that about 22% of loaded tractor-trailers exceed state weight limits. The Dept. of Transportation must work with the states to develop an effective weight enforcement program. Penalties severe enough to deter overweight operations should be imposed. Proposed draft legislation is appended.

by Elmer B. Staats
General Accounting Office, Washington, D.C. 20548
Rept. No. CED-79-94 ; 1979 ; 146p refs
Availability: General Accounting Office, Distribution Section, Room 1518, 441 G St., N.W., Washington, D.C. 20548

HS-027 128

WORK ZONE TRAFFIC CONTROL

Six papers are compiled which individually cover the following aspects of work zone traffic control: human factors considerations in arrow-board design and operation; experimental evaluation of markings for barricades and channelizing devices; visibility requirements for traffic control devices; effects of taper length on traffic operations; effects of longitudinal edge of paved surface drop-offs on vehicle stability; and field evaluation of traffic management strategies for maintenance operations in freeway middle lanes.

by Susan Singer-Bart, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-703 ; 1979 ; 42p refs
Includes HS-027 129--HS-027 134.
Availability: TRB $3.00

HS-027 129

HUMAN FACTORS CONSIDERATIONS IN ARROW-BOARD DESIGN AND OPERATION

Human factors are considered in the design, use, and operatio of flashing arrow boards. These factors involve the inherent meanings of arrow boards to drivers according to the display configuration, possible optimization of the display to convey the desired message, and possible optimum operation of the devices The study included a review of the literature, some limited fiel studies, and application of human factors expertise and judgments. The two experimental studies attempted to discern meanings associated with arrow-board configurations by obtainin subject responses to film clips of arrow-board operations. Th results indicate that the arrow board is strongly associated wit lane closure and that the use of an on-off blinking arrow i favored over the sequencing chevrons or sequencing arrow ster followed by the stem plus head. Arrow-board design and operation can be manipulated and optimized as long as drivers perceive a discrete, clear directional arrow as an indication of lan closure. Violation of this usage for other traffic manageme purposes leaves drivers uncertain how to behave. The preferre operation of the arrow board is by a single on-off blinkin arrow. The blinking arrow should not be used as a cautiona display only. The use of 360 degree lens hoods is required cap dispersing light to passing drivers and to direct the flashing lights outward in a straight line perpendicular to the arrow board. Dimming of luminance could be upgraded to be more sensitive to inclement weather conditions and to lesser diminution of daylight. Arrow boards should be placed at the beginning of the taper (construction zone).

by Beverly G. Knapp; Richard F. Pain
BioTechnology, Inc., Falls Church, Va.
Publ: HS-027 128 (TRR-703), "Work Zone Traffic Control," Washington, D.C., 1979 p1-8
1979 ; 34refs
Sponsored in part by Federal Hwy. Administration through a subcontract from Midwest Res. Inst.
Availability: In HS-027 128

HS-027 130

EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES

A series of four laboratory experiments was conducted to determine quantitatively the optimum design of markings on traffic control devices used in highway construction zones. The following marking parameters were studied: the design and configuration of stripes, width and color ratio of stripes, the meaning of various design configurations, and the detectability of visible areas (height to width combinations). For each of the experiments, 30 drivers recorded their detection and identification responses to stimulus slides, which were presented tachistoscopically. Data reduction consisted of analyses of a derived index score, which was a summary of the total response. It was determined that optimal stripe width is a 20- or 15-cm (8- or 6-in) stripe for 15 cm or greater rails. The desirable ratio of white-to-orange coloring favors equal white to orange or more white. Optimal stripe design configurations are first vertical, followed by horizontal. Chevrons connote directional meaning to drivers. Vertical panels elicit better performance than horizontal bars or trapezoid shapes. There was little useful difference between type 1 and type 2 barricades (single or double bar). A tall, narrow, vertical panel image is recommended over a shorter, wider device.

by Richard F. Pain; Beverly G. Knapp
BioTechnology, Inc., Falls Church, Va.
Publ: HS-027 128 (TRR-703), "Work Zone Traffic Control," Washington, D.C., 1979 p8-16
1979 ; 5refs
Conducted as part of the National Cooperative Hwy. Res. Prog. evaluation of traffic controls for street and highway work zones.
Availability: In HS-027 128

HS-027 131

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT

A study was undertaken to develop a performance requirement or standard for the detection and recognition of retroreflective traffic control devices used in work zones (drums, barricades, panels, and cones). By an analysis of existing information and data, a performance standard was established from the principles of driver information needs and, specifically, the requirement for decision sight distance. The standard states that the reflective device shall be installed and maintained so as to be visible at night under normal atmospheric conditions from a minimum distance of 275 m (900 ft) when illuminated by the low beam of standard autombile headlights. This standard would apply to any device used for channelization purposes in the work zone.

by Hugh W. Mcgee; Beverly G. Knapp
Wagner-Mcgee Associates, Alexanderia, Va.; BioTechnology, Inc., Falls Church, Va.
Publ: HS-027 128 (TRR-703), "Work Zone Traffic Control," Washington, D.C., 1979 p16-9
1979 ; 4refs
Sponsored by Federal Hwy. Administration.
Availability: In HS-027 128

HS-027 132

EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES

A direct comparison was made of traffic operations using the standard and a proposed taper length in the same construction zone. The proposed taper length formula yields shorter tapers at design speeds below 96 kph (60 mph) than does the existing formula (L equals WS, where L equals minimum length of lane-drop taper, W equals width of offset, and S equals speed limit or 85th percentile speed). The alternative formula is L equals W(S squared)/60. Speed, erratic maneuvers, traffic conflicts, and centerline encroachment data were collected at four sites, day and night, for a variety of design speeds and taper lengths. Data analyses did not imply that the proposed taper lengths are more hazardous than the standard taper length. Use of the proposed length did not produce a greater number of erratic maneuvers and slow-moving vehicle conflicts than did the standard or existing taper length. There was no indication that the proposed taper lengths resulted in a greater number of passenger vehicle or truck encroachments on adjacent lanes.

by Jerry L. Graham; Douglas W. Harwood; Michael C. Sharp
Midwest Res. Inst., Kansas City, Mo.
Publ: HS-027 128 (TRR-703), "Work Zone Traffic Control," Washington, D.C., 1979 p19-24
1979 ; 3refs
Sponsored in part by Federal Hwy. Administration.
Availability: In HS-027 128

HS-027 133

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY

The effect of edge of pavement drop-offs on vehicle stability is reported for 50 tests of professional drivers handling small-, medium-, and large-sized automobiles and pickup trucks off, along, and back onto drop-off heights of 38 mm (1.5 in), 89 mm (3.5 in), and 114 mm (4.5 in) at about 26.8 m/s (60 mph). Tests of two- and four-wheel drop-offs were conducted from an existing asphalt concrete shoulder onto both compacted soil and ashalt concrete surfaces. The drop-off heights had little effect on vehicle stability: steering wheel angles were generally 60 degrees or less; vehicle roll angles were 10 degrees or less. A significant jolt and accompanying front-end noise were experienced by the driver at the larger drop-off heights; there were no problems with vehicle alignment. Less than one wheel revolution was required for the first wheel to mount the drop-off heights. Varying amounts of front-wheel wobble caused mainly by an irregular drop-off edge were detected. There was virtually no deviation in vehicle trajectory as the vehicles remounted the drop-off edges, and the vehicles did not encroach into adjacent traffic lanes. Two nonprofessional drivers participated in a few supplementary tests. They had no difficulties driving over all three drop-off heights at 17.9-20.1 m/s (40-45 mph). The results of these tests were used to help evaluate the California maintenance standards in effect in 1974.

by Roger L. Stoughton; Douglas M. Parks; J. Robert Stoker; Eric F. Nordlin
California Dept. of Transportation, Div. of Construction
Publ: HS-027 128 (TRR-703), "Work Zone Traffic Control," Washington, D.C., 1979 p24-30
1979 ; 6refs
Availability: In HS-027 128

HS-027 134

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES

Results are presented of field studies conducted in Houston, Tex., to evaluate the performance of two innovative approaches for managing traffic during maintenance operations in the middle lane of an urban freeway. The two approaches, traffic shifting with use of the shoulder and traffic splitting, were used by District 12 of the Texas State Dept. of Highways and Public Transportation during pavement repairs on Interstate 45. The results of the studies indicate that, compared to the multilane closure strategy commonly used at middle-lane work sites (closure of an exterior lane and one or more adjacent middle lanes), both approaches significantly increased work-zone capacity. The studies revealed that traffic shifting could be used to manage traffic at relatively long work sites on freeways with discontinuous shoulders, and that shoulder use at sites where this strategy was employed was greatly influenced by traffic demand. Traffic splitting around an isolated, middle-lane work site, on the other hand, was used effectively at a relatively short work site on a freeway section that did not have shoulders.

by Stephen H. Richards; Conrad L. Dudek
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
Publ: HS-027 128 (TRR-703), "Work Zone Traffic Control," Washington, D.C., 1979 p31-6
1979 ; 2refs
Sponsored by Texas State Dept. of Highways and Public Transportation and Federal Hwy. Administration.
Availability: In HS-027 128

HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4

by R. L. Knoblauch; W. Moore, Jr.; P. R. Schmitz
BioTechnology, Inc., 3027 Rosemary Lane, Falls, Church, Va. 22042
DOT-HS-355-3-718
Rept. No. FHWA-RD-78-169 ; 1978 ; 38p 3refs
Rept. for Nov 1974-Apr 1976, Phases 3 and 4. For abstract, see HS-027 103 (Vol. 2, Final Rept.). Vol. 3, Appendixes, is HS-027 136. See also HS-802 266, Countermeasures For Rural and Suburban Pedestrian Accidents: Accident Data Collection and Analysis (Phases 1 and 2).
Availability: NTIS

HS-027 136

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT

Data were collected on 236 accidents involving pedestrians struck on limited-access highways in California, Michigan, Missouri, North Carolina, and Pennsylvania in an effort to identify causal factors in freeway pedestrian accidents and to develop countermeasures. The distribution of these accidents is tabulated for single field variables (related to descriptive, pedestrian, driver, vehicle, environmental, pedestrian and driver trip, site, roadway, collision, causal, and accident type factors). Copies of the data collection form and the field investigator coding manual are provided. Abbreviated descriptions are given of the various types of pedestrian accidents. Copies are included of operational forms used in the pedestrian accident survey, as well as a glossary. A Federal Hwy. Administration freeway pedestrian accidents survey conducted prior to the present project is described.

by R. I. Knoblauch; W. Moore, Jr.; P. R. Schmitz
BioTechnology, Inc., 3027 Rosemary Lane, Falls, Church, Va. 22042
DOT-HS-355-3-718
Rept. No. FHWA-RD-78-171 ; 1978 ; 161p 3refs
Rept. for Nov 1974-Apr 1976, Phases 3 and 4. Vol. 1, Executive Summary, is HS-027 135; Vol. 2, Final Rept., is HS-027 103. See also HS-802 266, "Countermeasures for Rural and Suburban Pedestrian Accidents: Accident Data Collection and Analysis" (Phases 1 and 2).
Availability: NTIS

HS-027 137

TRAFFIC STRIPE REMOVAL

Available information on methods to remove unwanted pavement markings is summarized, as obtained from various highway agencies throughout the U.S. The most frequent methods used are chemicals, grinding, high-pressure water jet, high-temperature burning, hydroblasting (sand and water), and sandblasting. A number of other burning and chipping techniques are used to a limited degree. The effectiveness of each method depends on the thickness of the marking, type of pavement, and operator skill. Both grinding and sandblasting are generally slow but effective in removing thick strips; these methods result in pavement damage when removing embedded paint. The high-pressure water jet is effective on portland cement concrete (PCC) pavements, but not as effective on asphalt. The hydroblaster can remove thicker paint stripes, is effective on PCC, and is less effective on asphalt. Chemical methods and high-temperature burning appear to offer the most economical and rapid means of removing pavement markings, but these methods are limited by marking thickness. One of the more successful approaches is the combination of two or more methods. A grinder is used to remove the marking material down to the pavement surface, followed by use of either a chemical or high-temperature burner to remove the material embedded in the pavement surface.

by Charles W. Niessner
Federal Hwy. Administration, Offices of Res. and Devel., Washington, D.C. 20590
Rept. No. FHWA-TS-79-227 ; 1979 ; 65p 16refs
Availability: Corporate author

HS-803 371

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978

This report is submitted to the Congress on the administration of the National Traffic and Motor Vehicle Safety Act of 1966; also provided is information on bumpers, as required by Title I, Section 112, of the Motor Vehicle Information and Cost Savings Act of 1972. An introductory chapter discusses the magnitude of the highway safety problem, persistent problems, and current trends. Subsequent chapters individually cover: areas receiving substantive attention (occupant crash protection and survivability, crash avoidance, fuel economy, commercial utilization of advanced automotive technology, consumer information and vehicle recalls, and data acquisition, analysis and reporting), crash survivability, crash avoidance, standards enforcement and defects investigation, standards summary, legal highlights and administrative enforcement, special programs (international cooperation, no-damage bumper system, odometer regulation enforcement), informing press and public, research and how it is used, and administration. A glossary of acronyms is included. Appended are a statistical compilation of accidents and injuries (and other traffic safety data), funding tables, a list of National Hwy. Traffic Safety Administration publications, a list of current research grants/contracts and problems they address, and a description of litigation.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Rept. No. AR-12 ; 1979 ; 139p refs
Availability: NHTSA

HS-803 372

HIGHWAY SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE HIGHWAY SAFETY ACT OF 1966 AS AMENDED, JANUARY 1, 1978--DECEMBER 31, 1978

This report submitted to the Congress on the administration of the Highway Safety Act of 1966, Section 202(a), also provides information on the administrative adjudication of traffic infractions and evaluation of driver education programs, as required by the Highway Safety Act of 1973. An introductory chapter discusses the magnitude of the highway safety problem, persistent problems, and current trends. Part 1 covers areas receiving substantive attention (55 mph speed enforcement, pedestrian safety, motorcycle safety, safety belt usage, and data acquisition, analysis, and reporting), safer drivers, safer vehicles, services that improve traffic safety, measures for informing press and public, National Hwy. Safety Advisory Com., international cooperation, Highway Safety Program Standards, research and how it is used, and administration. Part 2 covers highway safety within the Federal Hwy. Administration, highway safety research, and other highway safety programs. A glossary of acronyms is included. Appended are a statistical compilation of accidents and injuries (and other traffic safety data), a membership list for the National Hwy. Safety Advisory Com., funding tables, lists of National Hwy. Traffic Safety Administration and Federal Hwy. Administration publications, a list of current research grants/contracts and the problems they address, and a description of litigation.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Rept. No. AR-12 ; 1979 ; 169p refs
Availability: NHTSA

HS-803 657

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT

Background information is provided on current and future uses of plastics in passenger automobiles and the impact of changes in the characteristics of the average U.S. automobile is assessed, particularly on the producers of plastic resins. Total U.S. plastics consumption has increased at an annual rate of 6.5% from 1969 through 1977. Plastics consumption by passenger car manufacturers has increased at an annual rate of 8.4% over the same period. While there are over 20 generic types of plastics used in automobiles, the most important, in terms of tonnage, are polyurethane, polypropylene and its copolymers, polyvinyl chloride, thermosetting polyester resins, and acrylic-butadiene-styrene resins. The plastics content of the average car will probably increase from about 80 kg in 1976 to as much as 250 kg in 1990. Much of the growth will be as a result of new applications of plastic resins in exterior and functional parts, with thermosetting polyester resins, polyurethane, and polypropylene accounting for 20% of the projected increase. Major increases in manufacturing capacity will be required for some areas, requiring a total capital investment of about $1.7 billion (1978 basis) including investment for manufacture of basic petrochemicals, intermediates, and monomer manufacture. Reports on individual plastic compounds are appended.

by Robert Kaiser
H. H. Aerospace Co., Inc., Civil Air Terminal, Bedford, Mass. 01736
DOT-TSC-1333
Rept. No. DOT-TSC-NHTSA-79-21 ; 1979 ; 184p refs
Rept. for Jun 1977-Jul 1978.
Availability: NTIS

HS-803 721

"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA

The "Star of Life" has been adopted as the medical emergency care symbol, distinct from the Greek Red Cross symbol. Its use is approved by the appropriate agency and its advisory council within the Dept. of Health, Education and Welfare. It is applicable to all emergency medical goods and services funded under the DOT/EMS (Dept. of Transportation/Emergency Medical Services) program and criteria, and is recommended for use by the States. The orgin and meaning of the design (serpent entwined staff against a blue star with six flat points) are explained, its historical background presented, and its registration as a certification mark detailed. Specifications and uses are set forth.

National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590
1979 ; 16p
Availability: NHTSA

HS-803 763

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT

A risk analysis model of the automobile industry is developed to assess the impact of the Automotive Fuel Economy Standards (AFES) on each of the manufacturers in the industry. Data from reports written or sponsored by the Dept. of Transportation and from publicly available sources are used to illustrate the application of the model. Some insight is given into the interaction among the corporate environment, the manufacturer's strategy, and the AFES. It is concluded that the AFES tend to increase concentration in the industry, and to favor, relatively, the larger manufacturers having a full product line. Since increased numbers of small cars need to be sold to meet the AFES, larger cars become more expensive and smaller cars less expensive. Finally, several different economic and manufacturing scenarios are analyzed in detail, leading to a variety of more specialized insights. The scenarios include increased capital expenditures, no AFES, higher AFES, foreign entry into the mid-size car market, and a shift in market shares of domestic manufacturers. Three other scenarios examine economic risk.

by Stephen P. Bradley; Aneel G. Karnani
HH Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730
DOT-TSC-1333
Rept. No. DOT-TSC-NHTSA-79-24 ; 1979 ; 151p 22refs
Rept. for Jun 1977-Jul 1978
Availability: NTIS

HS-803 805

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT

A series of four workshops was conducted on The National Maximum Speed Limit (NMSL) and highway safety programs, including the Federal/state role in NMSL compliance and related highway programs. Topics addressed included: a review of ongoing programs at the National Hwy. Traffic Safety Administration; the Controlled Access Highway Task Force; Non-Resident Violator Compact; CARE (Combined Accident Reduction Effort); radar detectors; roundtable discussion on 55 mph NMSL; and Highway Safety Programs. The most important and most frequent recommendations developed by these discussions were: that the President of the U.S. issue a statement supporting the NMSL and urging voluntary compliance; that funds authorized by Congress be specifically designed for use in achieving NMSL compliance, and that they be placed under the control of the state law enforcement agency; that NMSL compliance criteria be more realistic and attainable, with either a 70% compliance rate by 1982 or compliance based on median speed rather than on current criteria; that the same pressures of compliance be placed on all other agencies (i.e., courts, legislators, ect.) as those imposed on the law enforcement segment; and that Federal legislation be enacted to regulate (or provide) the manufacture, sale, and/or use of radar detectors. The activities of each regional workshop are outlined (Mountain Pacific, North Atlantic, Southern, and North Central regions). The appendices include the program objectives, a sample of the evaluation form sent to participants, the International Assoc. of Chiefs of Police resolutions, and remarks of the participants.

by Ronald H. Sostkowski
International Assoc. of Chiefs of Police, Bureau of Operations and Res., 11 Firstfield Rd., Gaithersburg, Md. 20760
DOT-HS-6-01345
Rept. No. PB-292 323 ; 1978 ; 281p 12refs
Availability: NTIS

HS-803 883

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT

The development is described of an integrated system throug which states can assure the dissemination of safe driving info mation to all categories of motor vehicle operators. The Syster addresses drivers in five subsystems and 16 components withi subsystems: qualification subsystem (new drivers, reading limi ed drivers, foreign speaking drivers); maintenance subsyster (licensed drivers, older drivers, physically limited drivers, nev residents); advancement subsystem (experienced drivers); im provement subsystem (traffic violators, drinking drivers, acc dent-involved drivers); special vehicle qualification subsyster (motorcycle operators, truck and bus, school bus, recreationa vehicle and emergency vehicle operators). Development of th following project materials is discussed: The Integrated Saf Driving Information System (ISDIS) Plan; Catalog of Availabl Materials; and State Guide. Other materials prepared under th project are appended, including the ISDIS Materials Ratin System; an Experienced Driver Manual; Ambulance Drive Manual; and School Bus Driver Manual.

by A. James Mcknight; Gerry A. Simone
National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
DOT-HS-6-01397
1978 ; 281p 12refs
Rept. for 6 Jun 1976-28 Feb 1978. Vols. 2-4 are HS-803 884--HS-803 886. Cover date is 1979.
Availability: NTIS

HS-803 884

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT

The Integrated Safe Driving Information System (ISDIS), described as a plan of state and Federal activity to improve th flow of safe driving information to operators of motor vehicle For planning purposes, drivers are divided into five subsysten and 16 target groups: the qualification subsystem includes ne drivers, reading limited drivers, foreign-speaking drivers; th maintenance subsystem includes licensed, older, or physical limited drivers and new residents; the advancement subsyste includes experienced drivers; the improvement subsystem i cludes traffic violators, drinking drivers, and accident-involve drivers; and the special vehicle qualification subsystem includ motor vehicle operators, truck and bus operators, school b operators, recreational vehicle operators, and emergency vehic operators. The system plan described the information requir ments, presentational materials, delivery programs, acquisitio incentives, implementation requirements, and evaluation tec niques appropriate to each target group. Recommendations a offered to the National Hwy. Traffic Safety Administration develop safe driving materials, and to promote their availabili and dissemination. Recommendations to the states include i proving the licensing process to ensure knowledge and skill the licensed driver, raising of standards for licensing tests, a active leadership in coordinating and supporting the activities of state and local agencies in disseminating safe driving information.

by A. James Mcknight; Gerry A. Simone
National Public Services Res. Inst., 123 North Pitt St.,
Alexandria, Va. 22314
DOT-HS-6-01397
1978 ; 311p 90refs
Rept. for 6 Jun 1976-20 Feb 1978. Vol. 1 HS-803 883; Vols. 3-4 are HS-803 885--HS-803 886. Cover date is 1979.
Availability: NTIS

HS-803 885

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT

Activities are described which may be undertaken by states to improve the flow of safe driving information to their drivers. The drivers addressed in this Guide fall into four categories on the basis of their information needs: the qualification category, where information is needed to help drivers attain minimal qualifications for safe driving (covers new, reading-limited, and foreign-speaking drivers); the maintenance category, where information is needed to help drivers maintain their ability to drive safely (includes licensed drivers, older drivers, and physically limited drivers); the improvement category, where information is needed to help drivers improve their driving safety (covers volunteers for safe driving courses, traffic violators and drinking drivers); the special vehicle operation category, where information is needed to help drivers operate vehicles other than automobiles (includes operators of motorcycles, trucks, buses, school buses, recreational vehicles, and emergency vehicles). Methods and incentives for disseminating information are described, and available materials discussed.

by A. James McKnight; Gerry A. Simone
National Public Services Res. Inst., 123 North Pitt St.,
Alexandria, Va. 22314
DOT-HS-6-01397
1978 ; 74p
Rept. for 6 Jun 1976-20 Feb 1978. Vols. 1-2 are HS-803 883--HS-803 884; Vol. 4 is HS-803 886. Cover date is 1979.
Availability: NTIS

HS-803 886

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT

A catalog is provided of informational materials available to assist state highway safety agencies in disseminating safe driving information to drivers. Included in the catalog are written, audiovisual, instructional, and mass media materials. The catalog provides the title of the material, a brief description of contents, including length or duration, producer, and preparation date, and the availability of the material, including the name and address of the distributor. The Catalog is organized in terms of the target groups described in the Guide, which identifies target groups of drivers, their information needs, and ways of delivering information to them.

by Diane B. Katz; Gerry A. Simone
National Public Services Res. Inst., 123 North Pitt St.,
Alexandria, Va. 22314
DOT-HS-6-01397
1978 ; 117p
Rept. for 6 Jun 1976-20 Feb 1978. Vols. 1-3 are HS-803 883--HS-803 885. Cover date is 1979.
Availability: NTIS

HS-803 887

AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT

Comfort and convenience aspects of safety belt systems in 1979 model cars were evaluated by 114 test participants in 30 test cars. The operation of the belt systems was divided into eight categories: accessibility, extending, buckling, fit, pressure, comfort (response when wearer reaches for glove box or looks out rear window), releasing, and retracting. Excessive slack in the shoulder belt, belt twisting, and improper retraction were noted during each trial. It was found that the belt systems do have varying comfort and convenience problems. The greatest problems with 1979 model cars occur when the user is reaching for the glove box or turning to look out the rear window; other problems include extending the latchplate over to the buckle, belt fit, belt pressure on chest and shoulder, and latchplate accessibility. Older users perceive fewer comfort and convenience problems. Shorter users have problems with fit and comfort, while taller users experience problems with belt retraction. Comfort and convenience ratings are not affected by subject weight and belt usage. Smaller cars have more accessibility problems. Two-door cars have more problems with accessibility, fit, comfort, and retraction than do four-door cars. Dual retractors create fewer retraction problems, while continuous loop systems cause fewer comfort problems. Bucket seats create problems with accessibility, extending, buckling, releasing, and retracting, while bench seats cause more fit, pressure, and comfort problems. Windowshade devices relieve belt pressure on shoulder and chest when properly used, but create excessive belt slack and incomplete retraction.

by Jonathan Tom; William Ellis; Naomi Henderson; Cecily Robbins
Verve Res. Corp., Unibank Bldg., 51 Monroe St., Rockville, Md. 20850
DOT-HS-8-01984
Rept. No. VS-62; PB-295 396 ; 1979 ; 91p
Rept. for Jul 1978-Jan 1979.
Availability: NTIS

HS-803 896

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3

Following a background discussion of the ASAP (Alcohol Safety Action Proj.) program and a review of previous, interim assessments of total ASAP impact, a study evaluated whether the ASAP program as a whole had a statistically significant impact on the number of alcohol-related crashes. Time series techniques were applied to nighttime fatal crashes at each of the 35 ASAP sites as well as those of each of 11 matching comparison sites. Based on the individual project analyses, 12 ASAP sites showed a statistically significant reduction in nighttime fatal crashes during their demonstration period. None of the comparison sites showed any significant decreases in nighttime fatal crashes between baseline and demonstration periods. The Albuquerque and Tampa projects showed increases in these crashes, as did three comparison sites. For 27 sites which conducted roadside breath test surveys, a decline from 53 to 46 drivers per thousand with blood alcohol concentrations greater than or equal to .10% was found from the baseline to operational surveys. Of the 19 sites which conducted actual baseline surveys (vs. 8 which used the first operational survey as "baseline"), 8 were among the 12 sites which demonstrated a significant reduction in nighttime fatal crashes while the others showed no change. The cost per fatality forestalled (total ASAP program cost of $88 million (Section 403 funds) divided by 563) was $156,306. The ASAP countermeasure ranks between 14th and 15th among 37 countermeasures in terms of cost per fatality forestalled. In addition to fatality reductions, ASAP benefits include reductions in night injury crashes, injury severity, and property damage crashes, plus forestalling economic and social losses to the community. In addition to the overall results, an analysis of each ASAP is provided (project description, data graphs and tables for ASAP and comparison sites).

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 91p 52refs
See also HS-804 032 and HS-804 033.
Availability: NHTSA

HS-803 966

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED.

Some of the most common motor vehicle emergency situations are described, with information on how they can be handled. The booklet is intended primarily for drivers relatively inexperienced in coping with emergency malfunctions in their vehicles. The first rule of crash avoidance is to keep a vehicle in safe running condition; tips are given on daily and weekly/monthly checkups, and periodic servicing. Precautions to observe when stopping on the highway are outlined. The following emergency situations are individually considered: throttle sticking, brake failure, loss of steering, loss of power-assisted braking and steering, fires, loss of lights, overheated engines, loss of oil pressure, alternator/generator failure, windshield wiper failure, dropped driveshaft, hood popup, submersion of car, loss of lug nuts on wheels, exhaust system failures, flat tires and blowouts, driving through water or in heavy rain or snow, and mini-emergencies (unruly children, insects, and clothing, upholstery, and ashtray fires). A list is provided of necessary or useful items to carry in the trunk or glove compartment.

National Hwy. Traffic Safety Administration, Office of Public Affairs and Consumer Services, Washington, D.C. 20590
1979 ; 31p
Availability: NHTSA

HS-803 973

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT

Information is provided for use by local government analysts in conducting feasibility studies of the administrative adjudication of traffic offenses. Experiences of administrative adjudication programs (AAP) in various jurisdictions (Rhode Island, Seattle, New York City, Buffalo, and Rochester) are described, as well as an AAP feasibility study prepared by the California Dept. of Motor Vehicles for the state legislature in 1976. Issues normally addressed in a benefit-cost analysis of alternative traffic offense adjudicative systems are discussed: basic arguments for administrative adjudication, legal and constitutional issues, anticipation of special-interest-group concerns, the monetary and nonmonetary treatment of benefits and costs, and the treatment of traffic safety issues. Methods of presentation of study findings and documentation for public information are discussed along with tactical issues associated with study planning and implementation.

by Anthony K. Mason; Thomas J. Novi
General Analysis, Inc., San Diego, Calif.; California Dept. of Motor Vehicles
NHTSA-P.O.-7-3161
1978 ; 33p refs
Vol. 2, Final Technical Report, is HS-803 974.
Availability: NTIS

HS-803 995

PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT

Results are detailed of a two-part study to examine the integrity of automotive electrical equipment and to determine the electromagnetic susceptibility of automotive electronic control systems. The design and failure modes for various electrical components and recommended corrective measures are discussed. Over 400 failed components were collected, tested and analyzed. Of these, 29% proved to be still operating within limits when bench tested. Further analysis suggested that either the symptoms might have been misdiagnosed by the mechanic, or there could be intermittent failures which the test procedures did not identify, or a failure existed related to the component but not actually within it. A second significant trend found in the study of faile components was the apparent reliability of the electronic components being employed on cars. Additional research dealt with the potential susceptibility of electronic control systems to electromagnetic radiation and the results of a measurements program designed to determine the extent of the susceptibility o three existing systems to the electromagnetic environment. Th need for electromagnetic compatibility standards is emphasized and various measurement techniques and means are discusse for setting limits in order to establish standards. Appended ar data on the design and failure mode study, control group failur data for the 12-month period, diagrams of the computer wirin harness, and schematics of special harness test boxes.

by Kim Uhl; Howard Turnage; Paul Bernazani; Jack Crenca
Atlantic Res. Corp., 5390 Cherokee Ave., Alexandria, Va. 2231
DOT-HS-7-01777
1978 ; 222p 18refs
Availability: NTIS

HS-804 030

FACT BOOK. STATISTICAL INFORMATION ON HIGHWAY SAFETY

A compendium of highway traffic safety information is presented giving statistical data on principal factors related to moto vehicle accidents, and recent research and development activit in the field of highway safety. The Fact Book is in fact she format (designed to be updated by inserting revised and reprin ed fact sheets) with each numbered issue of "Highway Safet Facts" providing complete information on a single subjec Areas covered are: exposure data pertinent to the pre-cra environment (general highway statistics, driver licensing, moto vehicle registration, motor vehicle mileage, passenger car usage characteristics, and travel speeds); and fatal accident data obtained from the Fatal Accident Reporting System (general statistics, occupants, pedestrians, bicyclists, and motor vehicles involved, and place and time).

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
1979 ; 84p refs
Availability: GPO

HS-804 032

SUMMARY OF NATIONAL ALCOHOL SAFETY ACTION PROJECTS

The nature of alcohol problems and traditional drunk driving programs are described, including background on the Alcohol Safety Action Proj. (ASAP) program, a summary of the success of the program in meeting its immediate goals, and an outline of program findings. These aspects are further covered in more detail and ASAP costs and revenues are discussed. The ASAP program included 35 projects, 2-5 1/2 years in duration, which involved an expenditure of $88 million of Section 403 funds between 1970 and 1977. At most ASAP sites, police were able to double or triple drinking driving arrests. The ASAP courts developed procedures that permitted much more rapid and efficient processing of DWI (driving while intoxicated) cases while preserving traditional judicial safeguards for defendants. About a quarter of a million drunk drivers, of which two-thirds were problem drinkers, were referred to education or treatment programs by ASAP's. When compared with a fine alone, almost any type of education or treatment program appeared to improve the subsequent driving record of social drinkers. Short-term treatment for problem drinkers appeared to be less successful. Mass media programs developed by ASAP's to enlist public support proved effective in increasing public awareness of the drinking driving problem and increasing support for ASAP's. In an evaluation of overall ASAP impact, nighttime fatal crash rates for the ASAP sites were compared with those of matched non-ASAP sites. The results show that ASAP's had a modest but significant effect in reducing this type of accident, a large proportion of which are alcohol-related. A financial analysis of ASAP data indicated the potential for projects to be self-sufficient. If approximately $200 could be collected from each DWI offender (as is being done in the Virginia ASAP), the basic cost of the program could be met from this source. Some of the funds must be used to increase enforcement to ensure client flow.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 32p 74refs
See also HS-803 896.
Availability: GPO

HS-804 088

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.

The feasibility and timing of implementing mandatory safety belt usage (SBU) laws in the states are examined. Past Federal efforts in restraint system usage are reviewed as well as state activities. The timing involved in the adoption of blood alcohol concentration tests, motor vehicle annual inspection, and motorcycle helmet usage legislation is reviewed to give an indication of what might be expected with enactment of SBU laws. Experiences with the motorcycle helmet use law and the 55 mph speed limit law are described. Public and safety official opinions are examined on the issue of SBU laws and foreign (Australia; Ontario, Canada; France) experiences with these laws are reviewed. Efforts to promote voluntary usage of safety belts are discussed: mass media campaigns, improvements in safety belt comfort and convenience, and use-inducing devices (warning light, buzzer). The effectiveness of SBU laws is examined in terms of fatality reduction estimates. An 80% usage rate of an improved three-point belt system (and a use-inducing system) with an effectiveness of 60% in fatality avoidance should result in a 48% reduction in the number of occupant fatalities which would otherwise occur in 1990. At a maximum, a 21% fatality reduction could be achieved in 1990 by voluntary methods without usage laws; the usage laws would account for the remaining 27%.

by C. Livingston; D. Fee; R. Knaff; P. Ziegler; J. Nichols; D. Trilling; R. Voas; J. Womack
National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590
1978 ; 60p 25refs
Availability: NTIS

HS-804 313

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE

On-site assessments were made of the ability of Colorado, Iowa, New York, and Oklahoma to identify highway safety problems, to select appropriate countermeasures, and to evaluate the results. The respective roles of the National Hwy. Traffic Safety Administration (NHTSA), the Federal Hwy. Administration (FHWA), and the states were examined as well. Officials contacted in the site visits were found to be knowledgeable and competent in administering highway safety program components or specific disciplines of safety. Few of those interviewed spoke in terms of managing or coordinating statewide highway safety programs, which are now fragmented and diffused among several state agencies. Many officials viewed themselves as managing merely a Federal grant-in-aid program, responsible only for those programs or projects actually funded through the Federal 402 program. It is recommended that the Secretary of Transportation issue instructions implementing the concept of a statewide Hwy. Safety Prog. administered through a State Hwy. Safety Agency via the rulemaking process of the Administrative Procedures Act. These instructions should be coordinated specifically within the National Governors' Assoc. Appropriate recommendations in the Transportation Res. Board's Report on the Role of the State Hwy. Safety Agency should be implemented. NHTSA and FHWA activities should be coordinated. The administration of the 403 Res. Prog. should be reviewed to ensure coordination with the states. The release of public information material to the mass media should continue to be coordinated with that of the states. The financial accounting system reporting on the 402 Grant Prog. should be changed to reflect the status of 402 funds within the states. State and Federal data collection systems should be reviewed by the National Hwy. Safety Advisory Com.'s Task Force on Hwy. Safety Data, and the Task Force on Emergency Medical Services (EMS) should monitor the implementation of the Dept. of Transportation-Dept. of Health, Education, and Welfare Memorandum of Understanding on Procedures Relating to EMS Systems.

National Hwy. Safety Advisory Com., State-Federal Relations Task Force
1979 ; 31p refs
Availability: NHTSA

HS-804 522

AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT

A comprehensive examination is presented of the current marketing practices, marketing methodologies, and decision-making processes utilized by the domestic automotive industry. The various marketing elements, such as products, consumer behavior, sales, promotion, distribution, advertising, and regulatory constraints are reviewed as they pertain to the automotive industry. Seven chapters specifically review industry competitive relationships, practical constraints on automotive decision-making, corporate organization for decision-making, consumer communications, marketing decision-making, assessment of current problems and issues, and state-of-the-art summary. Appendices focus on the organization of General Motors Corp. and Ford Motor Co., the product and market planning process graphics, and an example of a forward product strategy document. Where appropriate, the differences in marketing approaches employed by the four automotive manufacturers are highlighted, with some of the adjustments and problems faced by these manufacturers in their marketing pursuits.

by Patricia L. Braden; Seymour Marshak; Robert P. Whorf
Gilbert R. Green and Co., Inc., Natick Office Park, Natick, Mass. 01760
DOT-TSC-1322
Rept. No. DOT-TSC-NHTSA-79-31 ; 1979 ; 185p 16refs
Rept. for Mar-Sep 1977.
Availability: NTIS

HS-804 773

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS

National Crash Severity Study (NCSS) passenger car accident fatalities are compared to those in the Fatal Accident Reporting System (FARS), as a tool for evaluating NCSS data representativeness. Estimates are computed of the probability of fatality for NCSS for various conditions (i.e. fire incidence, occupant sex). In cases where two factors are highly correlated, such as rollover and ejection, modeling techniques are used to help quantify the effects of each variable. It is found that FARS and NCSS have similar distributions of many variables: urbanization, vehicle size, vehicle damage, occupant seating location, sex, and restraint use. For the NCSS file, many variables are associated with a much higher fatality rate. Of these, accident level variables include number of vehicles involved, urbanization, and fire or explosion incidence. High fatality vehicle variables include the change of velocity at impact, the direction of impacting force, and vehicle damage area. Occupant variables include seating position, age, sex, ejection, entrapment, and restraint use. Rollover and ejection are each independently associated with a higher fatality rate, with ejection appearing to be more significant. NCSS is considered the best currently available source of accident data for analyzing injury-related factors.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 72p 7refs
Availability: NHTSA

HS-804 782

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT

This supplemental evaluation examined the impact of the excep
tions made to predesignated treatment assignment, and assesse
the relative effectiveness of each version of the course. Th
effectiveness of three versions of the Defensive Driving Cours
was evaluated within the context of referral to treatment fro
the Special Adjudication For Enforcement system. The impac
of the exceptions was minor. A few differences in group compo
sition were found, but multiple regression analytic technique
controlled for the potentially biasing effects of these variables i
the recidivism analyses. Modest but significant reductions i
citation recidivism were detected for the Driver Improveme
Program (DIP) version of the course, probably the most prom
ising for future programs. The cost-benefit potential of the pr
grammed learning version of the course should be considere
as the instructor costs of DIP per student are substantiall
higher. Further exploration and evaluation of the Defensiv
Driving Course is recommended.

by Philip M. Salzburg; Carl L. Klingberg
State of Washington, Dept. of Licensing, Olympia, Wash. 9850
DOT-HS-343-3-682
1978 ; 65p 6refs
Rept. for Jul 1977-Apr 1978. Final Report (Dec 1976) is HS-80
216.
Availability: NTIS

HS-804 838

INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)

A compilation and evaluation is presented of data relating to th
1977 enforcement and roadside survey activities of the Stockto
Increased Driving Under the Influence (D.U.I.) Enforceme
Program. The project applies increased levels of personn
toward the reduction of alcohol-related accidents through d
tection and apprehension of persons driving under the influen
of intoxicants. The evaluation design called for an initial thre
month period of zero enforcement followed by nine months
enforcement with ten officers working city wide. After the Ta
Force was reinstated during the second year, alcohol and no
alcohol related collisions were lower than baseline levels, b
the change was not statistically significant. The roadside surve
measuring blood alcohol content indicated a reduction in t
number of persons drinking during Experimental Hours, partic
larly from 2 to 4 a.m. Traffic Task Force activity data sho
that the Task Force did impact the drinking driver; analysis
the collision data by areas of patrol concentration shows d
creases in total collisions in the area where Traffic Task For
activity was greatest and increase in collisions where it w
minimal. The results suggest that the original statistical desi
was not sensitive to changes in the collision data. Enforceme
recommendations are made for the future.

by Janet Hause; Edward Chavez; Roseann Hannon
Stockton (Calif.) Police Dept.; University of the Pacific, Stockton, Calif.
DOT-HS-5-01194
Rept. No. AR-3 ; 1979 ; 149p
Rept. for Jan-Dec 1977.
Availability: NTIS

HS-804 850

AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS

Multiple regression analyses were used to estimate the strength of the relationship among driver education enrollment, the presence of laws requiring driver education for licensing before age 18, and the rate of licensing of 16- and 17-year-olds between 1965 and 1975. Results showed that driver education is significantly and positively related to the licensing rate of 16- and 17-year olds. This relationship may be as strong as a .42 increase in licensed drivers per enrollment in driver education. The relationship was not greatly diminished when economic and mobility factors were controlled, and was stronger between 1971 and 1975 than it was between 1965 and 1970. The presence of driver education laws had a significant direct negative relationship with the licensing of young drivers while it had a positive relationship with driver education enrollment. These results suggest that driver education probably accounts for at least some increase in the licensing of young drivers. The implications of these findings for high school driver education, motorcycle rider education, and education for traffic offenders are discussed. Appended are a review of states with and without driver education provisions for driver licensing and plots of driver education and licensing data by state.

by W. B. Seaver; J. L. Nichols; W. L. Carlson; R. B. Voas
National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
1978 ; 111p 20refs
Cover date is 1979. Rept. for 1965-1975.
Availability: NTIS

HS-804 852

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS

When the complete National Accident Sampling System (NASS) is in operation, approximately 18,000 accidents will be selected annually by a carefully designed sample, and data will be gathered by accident investigation teams. The data will be used to design and evaluate highway safety measures. Detailed implementation planning by the National Center for Statistics and Analysis in support of NASS is described. The following major implementation tasks have been identified: implement a pilot Continuous Sampling System, design special studies, design improved sample frame, develop accident causation methodology, develop exposure data system, evolve regular field operations, combine exposure and pre-crash data analysis, revise field data collection and quality control, expand to a national system, develop analysis for NASS estimates, and operate an integrated national system. Resource requirements (manpower and funding) are also discussed.

by Russell A. Smith; Eugene Lunn
National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
1979 ; 60p 8refs
Vol. 1 is HS-804 027; Vol. 2 is HS-804 028; and Vol. 3 is HS-804 029. See also HS-804 888 and HS-804 909.
Availability: NHTSA

HS-804 858

AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)

A preliminary evaluation was undertaken to determine the effectiveness of Federal Motor Vehicle Safety Standard (FMVSS) 214 in preventing intrusion and occupant casualties in side impacts, to measure the actual cost of the standard, and to assess its cost effectiveness. FMVSS 214 sets crush resistance requirements for the side doors of passenger cars. The evaluation was based on statistical analyses of National Crash Severity Study accident data and teardown analyses for cost estimation. It was found that FMVSS 214 prevents a substantial proportion of fatalities and severe injuries in single-vehicle, side-door impact crashes. The standard reduces the likelihood of intrusion in nonlateral, side-door impact crashes. It is significantly less effective in multi-vehicle crashes. FMVSS 214 adds $56 to the cost of purchasing and operating a car over its lifetime. It was demonstrated that the performance requirements of the standard are meeting their goal of reducing intrusion in side-door impacts, and that the standard is cost-effective. Additional calculations, raw data, effectiveness evaluation tools, trends, and effects relating to the promulgation or non-promulgation FMVSS 214 and casualties are appended.

by Charles Jesse Kahane
National Hwy. Traffic Safety Administration, Office of Prog. Evaluation, 400 7th St., S.W., Washington, D.C. 20590
1979 ; 205p 30refs
Availability: NTIS

HS-804 884

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979

Following a summary of tabulations of recall campaigns, details are given on the individual domestic and foreign recall campaigns, with information on NHTSA identification number, date of company notification, make and model, model year, number of pages on file, number of vehicles recalled, a brief description of the defect, and the manufacturer's corrective action. Status of the recall campaigns as of March 31 is provided. Types of vehicles recalled include passenger cars, motorhomes, station wagons, light, medium, and heavy duty trucks, camper vans, camper trailers, buses, school buses, and motorcycles. Equipment under recall includes tires, anti-lock brake systems, axles, jacks, fuel filters, steering column assembly components, luggage racks (on motorcycles), and fuel hoses.

National Hwy. Traffic Safety Administration
1979 ; 47p
Availability: GPO, stock no. 050-003-00369-7

HS-804 888

THE NATIONAL ACCIDENT SAMPLING SYSTEM MEETING HELD OCTOBER 16-17, 1978

A public meeting was held on 16-17 Oct 1978 in Rosslyn, Va. to review the progress of the National Accident Sampling System (NASS) over the two years since the last review and to make recommendations to the National Hwy. Traffic Safety Administration (NHTSA) to enhance NASS implementation in the future. Twenty-three participants reviewed documents and presentations prepared by NHTSA and contractor staff. Following subcommittee deliberations, they unanimously agreed upon 22 recommendations which were submitted to NHTSA on 19 Dec 1978. Background information is presented on the objectives, organization, structure, and implementation of NASS, and the preparation and agenda are described. The recommendations concerning NASS implementation, operation, and policy, and response by NHTSA are presented. Appended are lists of participants and attendees. It was concluded that since the 1976 review, the NASS has made steady progress, and that most of the previously identified problems have been solved or are being addressed.

Management Engineers, Inc., Reston, Va.
1979 ; 36p 4refs
See also HS-804 027--HS-804 029, HS-804 852, and HS-804 909.
Sponsored by National Hwy. Traffic Safety Administration.
Availability: NHTSA

HS-804 909

NATIONAL ACCIDENT SAMPLING SYSTEM. PILOT STUDY. FINAL REPORT

A pilot study of the National Accident Sampling System (NASS), using ten randomly selected data collection sites, demonstrated the feasibility of the concept as a means of producing a nationally representative accident data base. Overall missing data rates and nonresponse rates for major field tasks reached acceptably low levels by the end of the study. Urbanized areas had a missing data rate approximately twice as high as rural areas with respect to important NASS variables. The initially high error rates experienced by most data collection teams were improved through remedial training, and did not appear to be affected by locale. The error and missing data rates, and the variability of the latter were found to be sensitive indicators of training deficiencies, coding procedure ambiguities, and weaknesses in data definition. A smaller team size of three persons proved adequate to the investigative tasks. In urban centers, a larger team may have less difficulty in keeping the missing data rate at an acceptable level. Uniformity of the nonquantifiable aspects of quality control of the NASS data file that depend upon subjective judgment can be achieved only through intensive, centralized management oversight.

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
1979 ; 36p 3refs
See also HS-804 027--HS-804 029, HS-804 852, and HS-804 888.
Availability: NHTSA

HS-804 914

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT

Results are summarized of a study to describe and assess the corporate decisionmaking processes of major domestic automotive manufacturers: American Motors, Chrysler, Ford, and General Motors. Through a series of quantitative and judgmental models, the attractiveness was estimated of a number of alternative strategies for each manufacturer, with an assessment of the long-term impact of these strategies on financial and other characteristics of each firm. Technological strategies appear better responses for the financially stronger firms; lobbying and organizational strategies most important to weaker firms. It is concluded that all the domestic manufacturers will survive and meet the 1985 fuel-economy standards, that AMC will phase itself out of passenger automobiles in favor of its light-truck and bus business, and that Chrysler's market share will decrease in the face of increased competition from GM, Ford, and foreign manufacturers.

by Harold S. Becker
Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
DOT-HS-7-01784
1978 ; 55p
Rept. for Oct 1977-Nov 1978. Vols. 2-4 are HS-804 915--HS-804 917. Corporate author's cover address: 124 Hebron Ave.
Availability: NTIS

HS-804 915

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT

The likely actions and policies of the four major U.S. manufacturers (American Motors, Chrysler, Ford, and General Motors) between 1978 and 1985 are described. The socioeconomic scenario is a composite based on long-term forecasts of economic growth, excluding possible recessions or booms, consistent with secular forecasts of most major econometric data services. In descriptions of the various companies, an industrial dynamics model was used to project total demand for automobiles, and a model based on historical factor analysis of new-car purchases was used to simulate consumer response to the companies; the market shares of each company were projected. Another model estimated each company's strategies for meeting the fuel-economy standard. A financial analysis of the individual firms was then made, with projections of the financial indicators. Appended are an analysis of recurring issues affecting boardroom decisions and a study of time-lines in new-product development.

by Harold S. Becker
Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
DOT-HS-7-01784
1978 ; 214p refs
Rept. for Oct 1977-Nov 1978. Vol. 1 is HS-804 914; Vols. 3-4 are HS-804 916--HS-804 917. Corporate author's cover adress: 124 Hebron Ave.
Availability: NTIS

HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT

An historic overview is presented of the corporate strategies of the four major automotive manufacturers: American Motors, Chrysler, Ford, and General Motors. The socioeconomic environment of the past 20 years is described, with each manufacturer's response to external influences, and its resulting financial and other characteristics. Changes in conditions in the U.S. which influenced the business strategies and product lines of the industry are discussed, including government regulations, labor relations, foreign competitors, availability of materials, and fluctuations in the economy.

by Harold S. Becker
Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
DOT-HS-7-01784
1978 ; 193p refs
Rept. for Oct 1977-Nov 1978. Vols. 1-2 are HS-804 914–HS-804 915; Vol. 4 is HS-804 917. Corporate author's cover address: 124 Hebron Ave.
Availability: NTIS

HS-804 917

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT

The adaptation of a computer simulation model is described and assessed for use in studying the corporate strategies of automotive manufacturers. The original model was developed by Pugh-Roberts Assoc. to assess the corporate strategies of automotive manufacturers in response to changing economic, regulation, and consumer buying patterns. Deficiencies in the original model have necessitated a number of changes; those already incorporated in the new version by The Futures Group have resulted in a reasonable fit between historical auto sales and the model's simulation of auto sales. Until the balance of recommended changes are made, the remaining outputs are not usable. A cost estimate to complete the changes is given.

by Harold S. Becker
Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
DOT-HS-7-01784
1978 ; 35p
Rept. for Oct 1977-Nov 1978. Vols. 1-3 are HS-804 914–HS-804 916. Corporate author's cover address: 124 Hebron Ave.
Availability: NTIS

HS-804 918

ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT

Vehicle safety problems are described which were reported in interviews with 460 physically limited drivers and 41 physically limited non-drivers. The problems involved operation of primary and secondary controls, operating other vehicle mechanisms (e.g., restraints, seat adjustments), seeing properly, getting in and out of the vehicle, and handling certain tasks outside the car. The following needs were identified: Better dissemination of information to physically limited drivers concerning vehicle design considerations, equipment options, available aids and devices, operating procedures, and procedures for maintaining adaptive control equipment; development of additional assistive devices, including a secondary control stalk, rear vision system, supportive restraint systems, and a means of preventing feet from sliding under foot pedals; improvements in adaptive control systems, including improvements in reliability, comfort, compactness, and physical appearance.

by A. James McKnight; Molly A. Green; Frank Masten; Rodger J. Koppa
National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
DOT-HS-6-01439
1979 ; 128p 87refs
Availability: NTIS

HS-804 985

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT

A sled test program was conducted for route school bus and activity bus occupant seats to determine the response of dummies in simulated frontal collisions, using the variables of seat spacing, test velocity, lap belts and no lap belts, differing dummy sizes, and seats from different manufacturers. Test results, with photographs, are presented, and an evaluation of the results is made. Lap belts do not seem to have a significant effect on the response characteristics of a 50th percentile adult male dummy, for the test conditions. Seat spacing has only a minor effect on the response characteristics of the adult dummy and only a slightly higher effect on the child dummy. The head response of the adult dummy seems to be dictated by the head/seat back contact geometry; impacts to the neck and throat offer the greatest protection from head accelerations. Impacts involving the child dummy show a severe spinal whipping apparently caused by the "beaming" of the torso inertial loads to the head and knee contact points; further study in this area is recommended. Impact speed affects the child dummy more than the adult. Compartmentalization seems to be a problem primarily for the larger dummy size; all child dummies were 100% contained during impact and rebound. Since all tests were normal (0 degree) frontal impacts, compartmentalization may be sensitive to the obliqueness or angle of impact, especially to the unbelted dummy.

by Anthony R. Bayer, Jr.
National Hwy. Traffic Safety Administration, Engineering Test Facility, P.O. Box 37, East Liberty, Ohio 43319
Rept. No. RD-678-2 ; 1978 ; 150p 4refs
Rept. for Jun-Dec 1978.
Availability: NTIS

HS-805 017

1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT

During the year that the Tennessee law providing for protection of child passengers less than four years old has been in effect, the child Passenger Safety (CPS) program has been providing both a public information and education campaign to supplement the law, and an evaluation of the effectiveness of the promotional campaign. The 1978 activities of the CPS are described, including a discussion of the public information and education (PIandE) campaign, some measures of its effectiveness, and objectives for the coming year; previous relevant research is described; specific segments of the public information and education activities are considered; and data collection, analysis and interpretation are discussed. The PIandE plan is functioning well; child restraint device sales were substantially higher in 1978 than previously; community contacts and commitments increased. An educational campaign to raise the level of safety consciousness is recommended; certain child restraint device design problems related to comfort and convenience must be solved. Most important is strict enforcement of the law.

by John W. Philpot; Randy L. Perry; Elizabeth C. Hughes; Dewey A. Wyrick; Carol J. Culler; Mark Lo; Kevin C. Trent; Linda Geiss
University of Tennessee, Transportation Center, Knoxville, Tenn. 37916
DOT-HS-7-01730
Rept. No. TC-79-006 ; 1979 ; 141p 57refs
Availability: NTIS

HS-805 033

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT

Several tasks are described involving the development, implementation, and documentation of analytical tools and computer software in support of activities related to automotive fuel economy. These activities include documentation and modification of a fuel economy projection program, tabulation of percentage of automobile sales by weight class and model year, manipulation of files from the 1978 Environmental Protection Agency data base, determination and prediction of survival probability as a function of vehicle age (automobiles and trucks), and determination of the distribution of reported fuel economy errors due to rounding and the distribution of inertia weight error due to classification. Also included are an analysis of 1976-77 data concerning vehicle miles travelled on the basis of magnetic tapes received from the State of New York, and development and implementation of a data base management system that will facilitate enforcement of automobile dealer compliance with regulations requiring display and availability of fuel economy information for the consumer. Procedures used to maintain data base integrity and security are also documented.

by L. A. Kleiman; R. E. Young
H H Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730
DOT-HS-7-01691
1979 ; 231p
Rept. for Sep 1977-Mar 1979
Availability: Reference copy only

HS-805 035

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT

A procedure was formulated to forecast the nature and scope of the moped accident problem potential in the U.S., to predict outcomes for such input values as sales volume, usage patterns, and crash rates, and based on the outputs, to recommend National Hwy. Traffic Safety Administration research and safety program action. Foreign literature sources are examined which describe the use of the moped in other countries and relate this to the U.S. experience. Topics include moped legislation abroad and in the U.S.; numbers of mopeds, extent of usage, and user characteristics; accident data (primarily rider and environment); collision characteristics; and the nature of injuries to accident-involved moped riders. In the U.S., the moped is used by many persons over 45 to 50 years of age, primarily for pleasure and recreation, while in Europe its use is more by the young for utilitarian purposes; this difference affects the accident experience. There is a move toward mandatory use of helmets in Europe. The appendix includes a review of the docket on motorized bicylces and findings from an independently conducted market survey on U.S. moped sales and characteristics of the users. Data are provided from interviews with executives of the six largest moped distributors in the U.S. for use as independent projections of future sales. The survey also uncovered several consumer characteristic surveys from which selected tabulated data are provided.

by William W. Hunter; Jane C. Stutts
University of North Carolina, Hwy. Safety Res. Center, Chapel
Hill, N.C. 27514
DOT-HS-8-01887
1979 ; 371p 120refs
Rept. for Feb 1978-May 1979. Vol. 2 is HS-805 036.
Availability: NTIS

HS-805 047

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT

The revision is described of the National Hwy. Traffic Safet
Administration's (NHTSA) 1973 training program in emergenc
medical care for the first person to respond to a traffic acciden
The program was entitled "Crash Injury Management for Tra
fic Law Enforcement Officers" (CIM). The CIM program ha
been revised to ensure that it is up to date in technical conter
and instructional strategy, and the name of the program wa
changed to "First Responder: Emergency Medical Care Trai
ing Course." Suggestions for the revision were obtained fro
users and NHTSA expert reviewers. A reference text in eme
gency medical care served as a standard for the technical co
tents of the course; all basic life support procedures we
checked with the American Heart Assoc. The revised cour
design includes 28 lessons (including one optional lesson) i
volving a minimum of 40 hours of training time. The title, tim
required and brief description is given for each lesson. As wi
the original CIM course, the curriculum package includes
Instructor's Lesson Plan, a Student Study Guide, and a Cour
Guide, all three of which received a complete technical updat
The Student Study Guide was expanded to include specif
patient assessment and emergency care procedures.

by Arlene M. Cleven; Edward W. Bishop
Dunlap and Associates, Inc., One Parkland Drive, Darien,
Conn. 06820
DOT-HS-7-01731
Rept. No. ED-78-10 ; 1978 ; 25p 1ref
Rept. for Oct 1977-Nov 1978. See also HS-900 025, HS-900 02
and HS-900 027.
Availability: NTIS

HS-805 052

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT

by C. Strother
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
DOT-HS-6-01412
1978 ; 18p
Rept. for Aug 1976-Aug 1978. For abstracts, see vols. 2-4, HS-
805 053–HS-805 055.
Availability: NTIS

HS-805 088

ADVANCED CRASH RECORDER DEVELOPMENT. IMPLEMENTATION PLAN

The implementation plan is presented for advanced crash
corder use in evaluating vehicle accident data. Major eleme
of the implementation plan encompassing acceleration data
associated accident parameters are acquisition (recorder depl

ment and data retrieval), consolidation (rapid access and crash data assimilation), and processing and analysis (data base development, data reduction, and studies and reports). The effective use of actual vehicle accident data can enhance the development, implementation, and evaluation of motor vehicle and highway safety standards and countermeasures. Successful implementation of the advanced crash recorder depends on recorder deployment and the retrieval of pertinent accident data at minimum cost. Acceleration data retrieval can be accomplished in conjunction with routine accident investigation tasks. Accident data can be quickly consolidated at the analysis center via commercial telephone circuits. The data retrieval and analysis system provides the capability for immediate processing and the development of a historical data bank. Benefits of this system include rapid association of accident parameters, immediate access to current accident information, reduced analysis time and costs, and early trend recognition.

Teledyne Geotech, 3401 Shiloh Rd., Garland, Tex. 75041
DOT-HS-7-01641
Rept. No. TR-79-5 ; 1979 ; 42p
Cover title: Advanced Recorder Design Development. Test Report is HS-805 089. For final report see HS-804 081.
Availability: Reference copy only

HS-805 089

MODEL 44400 AUTOMOTIVE CRASH RECORDER.

Engineering tests were performed on Teledyne Geotech's Model 44400 Automotive Crash Recorder, in order to prove basic design concepts and circuitry for five prototype units. Performance tests focused on requirements, clock frequency, memory battery current, calibration, trigger level, functional voltage level, linearity, primary power loss, and temperature drift. Environmental tests concerned high/low temperature, temperature/humidity, vibration at room high/low temperature, shock at room high/low temperature, and salt fog. Test results identified areas of needed improvement.

Teledyne Geotech, 3401 Shiloh Rd., Garland, Tex. 75041
DOT-HS-7-01641
Rept. No. TR-79-6 ; 1979 ; 34p
Cover title: Advanced Recorder Design Development.
Implementation Plan is HS-805 088. For final report see HS-804 081.
Availability: Reference copy only

HS-805 104

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT

Testing performed as part of the Mobile Vehicle Inspection/Repair Program is detailed. Program objectives are to eliminate inconvenience associated with vehicle diagnosis and repair, to conduct a thorough diagnosis so that only necessary repair work is performed, and to communicate the condition of the vehicle to the owner in accurate and understandable terms. Five projects implemented in the St. Louis area pertained to vehicle diagnostic inspection and repair for company employee vehicles on company parking lots, management of a company fleet, individual vehicle inspection and maintenance at the owner's residence or place of employment, working with oil company garage networks to increase station bay utilization and to reactivate neighborhood repair facilities, and service for vehicle leasing companies. Vehicle inspection, diagnostic, and repair procedures are described, and case results of vehicle inspections and repair work presented. Equipment cost and van layouts are shown, and system constraints are discussed. Suggestions regarding general system application on a nationwide basis are offered. Appended are vehicle inspection procedural information, specific case results, news articles, and forms used in mobile inspection and repair programs.

by John N. Noettl
United Systems Testing, Inc., 372 Fee Fee Rd., Maryland Heights, Mo. 63043
NHTSA-9-6131
1979 ; 209p
Rept. for Nov 1978-May 1979.
Availability: Reference copy only

HS-805 116

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984

The plan is designed to develop state traffic records systems that can provide information in a format easily summarized at the national, regional, state and local levels of government for program planning, management, and evaluation. Problems inhibiting the development of adequate data and data systems are addressed. In priority order, the aims are to improve the content and quality of accident data, to upgrade data analysis capability in each State, to demonstrate Model Traffic Records systems, to promote data uniformity and standards through the American National Standards Inst. D-20 process and the National Hwy. Traffic Safety Administration Design Manual, to maintain a management information system responsive to the needs of traffic safety program managers, and to establish improved position location systems for accidents, traffic citations, or roadway features. A discussion of current problems with traffic records systems (incompleteness, unreliability, lack of standardization) is followed by a review of projects giving support and technical guidance to traffic safety programs. Among these are the Data Analysis and Reporting Techniques (DART) project, the Model State Traffic Records System, and the LORAN-C (Long-Range Navigation) project, the last adapted from a marine navigation system. A sample six-year budget plan is included.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 10p
Availability: NHTSA

HS-805 117

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984

The program plan is designed to improve the effectiveness and uniformity of state registration and titling practices, to develop methods to deter motor vehicle theft, to identify vehicles and owners rapidly, to assist in prevention and recovery of stolen vehicles, and to encourage owner response to manufacturer defect recall campaigns. While the states' capability for rapid identification of vehicles and owners has increased in past years, the traditional concept of the vehicle registration program as a revenue producer has retarded its safety potential; the program should be regarded primarily as a support to highway safety. All states should have a title law, with effective ownership procedures requiring physical checking of the VIN, review of ownership documents, control of registration plates, and of salvage vehicles and their titles, to help prevent the fencing of stolen vehicles. Compliance with the defect recall campaigns should be promoted. A budget plan for motor vehicle registration, titling, and antitheft procedures for 1980 through 1984 is included.

National Hwy. Traffic Safety Administration, Washington, D.C.
20590
1979 ; 10p
Availability: NHTSA

HS-805 269

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)

This consumer resource guide tells how to obtain information on automobiles and where to go with complaints. It includes a list of national consumer affairs associations, Federal agencies concerned with automobiles, manufacturers and their addresses, automobile-related publications, Federal Information Centers operated by the General Services Administration, and Action Line broadcasters. The focus is on government consumer offices and private consumer groups. A toll free telephone number (800-424-9393) is provided for an auto safety hotline, sponsored by the National Hwy. Traffic Safety Administration.

National Hwy. Traffic Safety Administration, Washington, D.C.
20590
1979 ; 52p
Availability: NHTSA

HS-810 355

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)

In 1978, only 27% of trucks surveyed by the National Hwy. Traffic Safety Administration (NHTSA) were travelling at or below 55 mph; over 32% were exceeding 60 mph. Fatalities involving combination trucks grew to over 4600 in 1978, an increase of 39% over 1975; 73% of these fatalities occurred on roads posted at 55 mph. Professional truck drivers should voluntarily comply with the 55 mph law, not only for safety but also for fuel economy reasons. One of the major priorities of NHTSA in 1979 is large truck safety. Ride quality is another major concern. In NHTSA's Five Year Plan for Motor Vehicle Safety Rulemaking (Apr 1979), items related to heavy-duty vehicles cover interior noise levels, rear underride, stopping distances, hazards of the explosive separation of multipiece rims, direct fields of view and mirror systems, and truck splash and spray. Bureau of Motor Carrier Safety rulemaking is also underway on cab interior temperatures, and on fumes and toxic gases. Participation is invited by Teamsters union representatives and individual truck drivers at an NHTSA public meeting on truck safety to be held in Washington, D.C. on 10-11 Sep 1979. NHTSA emphasizes the importance of the trucking industry in continuing to advise the agency on truck safety matters.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C.
20590
1979 ; 12p
Availability: NHTSA

HS-810 356

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)

The automakers must play a major role in achieving U.S. lon
range fuel conservation goals. Average fuel economy levels i
the 40 to 50 mpg range projected for the 1990's would sav
about 2 million barrels of oil a day (the amount now bein
imported). The trend toward more fuel-efficient cars has no
been firmly established. Heavy industry investments in downsi
ing, the preponderant emphasis on fuel economy in automotiv
advertising, and the worldwide quest for a new energy-efficien
environmentally clean, and safe car all demonstrate a near tot
commitment to the socially responsible car. Motor vehic
safety developments must proceed in step with energy efficienc
developments. As an example of a safe and energy-efficient ca
the Minicars Research Safety Vehicle gets 30 miles to the gallo
and offers occupant protection in a 50 mph frontal barri
impact and in a side impact by a similar sized car at the sa
speed. If the U.S. auto fleet had the same characteristics, annu
fatalities could be reduced by over 12,000 and fuel usage b
half. Timely investments in innovative research and develo
ment can reduce automotive expenses and can make the U.
industry fully competitive with foreign automakers.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.
20590
1979 ; 13p 1ref
Availability: NHTSA

HS-810 357

REMARKS BEFORE THE ALLIANCE OF AMERIC INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979

Economic efficiency and health-safety aspects of the insura
industry are addressed. Achieving reductions in environme
and safety hazards is a difficult task. Some insurance executi
are reluctant to cooperate with government entities because
concern that support for regulatory activities will increase re
lation of the insurance industry itself. This view fails to dis
guish between health-safety regulation designed to protect
public from needless bodily harm and economic regulation,
it fails to recognize that health-safety regulation may red
public outcry to the high costs of insurance coverage.
insurance industry can take steps to minimize highway rela
losses. Possible options are to publicly report findings in
course of regular insurance investigations on harmful produ
and safety defects; to differentially rate cars based on de
characteristics; to use fleet purchases to influence prod
design; to encourage public communications; to influence pu
policymaking in Washington, D.C.; and to foster vehicle sa
design and production.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D
20590
1979 ; 13p
Availability: NHTSA

HS-810 359

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979

It is proposed to increase the severity of sanction procedures established by 1978 amendments to the national maximum speed limit, by increasing the percentage of a State's motorists that must conform to the 55-mph speed limit each year, and by increasing the amount of noninterstate funds withheld if a state fails to meet the required compliance percentage. Since the 55-mph speed limit was introduced in Jan 1974, a dramatic reduction in highway deaths and injuries has occurred, from 54,052 in 1973 to 45,196 in 1974. It is estimated that at least half of the lives saved are directly attributable to slower and more uniform traffic flow produced by the national speed limit. Medical studies indicate that the number of spinal cord injuries caused by automobile accidents has dropped significantly and that the most important factor in injury reduction is the reduced speed limit. Enforcement of the 55-mph speed limit is the responsibility of States. Individual law enforcement agencies are engaged in innovative and aggressive enforcement programs, and several states use aircraft in speed limit enforcement. National speed limit activities are examined, public support of the limit is reported, and speed monitoring is discussed.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 15p
Availability: NHTSA

HS-900 032

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.

This course guide describes a refresher training program for emergency medical technicians (EMT's) which is designed to assure continuance of a uniformly high level of knowledge and skills among EMT's who have completed the Dept. of Transportation's Basic Training Course. An introduction, including a course overview, is followed by sections on course administration, resource requirements, and course evaluation procedures. Appended are a sample application packet, handout materials, a refresher training program resources table, and a process evaluation checklist. The course is to be offered under the medical direction of a physician and a Course Administrator. The administrator should be experienced in emergency medical care, should be aware of the legal constraints under which EMT's operate, and should work closely with the medical director to assure constant course updating. He should also know the performance requirements of experienced EMT's in the jurisdiction where the course is offered. The course is divided into 20 lessons, each of which requires 1 to 1.5 hours to complete. The lessons may be given in individual units for presentation one or more times a week, may be combined into 6- to 8-hour units for presentation in a 3 to 5-day period, or may be offered over an extended period ("continuing education"). The majority of lessons will be presented in a classroom, with sufficient space for seating a maximum of 20 students, and a lecture and demonstration area. It is recommended that this facility be located at a hospital. Since one lesson requires the use of automobiles, a special facility such as a garage or school is required. Two separate but interdependent types of evaluation are required. Process evaluation is used to determine if the training personnel are performing as planned and that the program schedule is being maintained. Outcome evaluation pertains to trainees' achievement of satisfactory job performance knowledge and skills.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 34p
Clearinghouse Training Materials. Subject: Emergency Services. Format: Course Guide. Type of Audience: Emergency Medical Technicians.
Availability: GPO, stock no. 050-003-00363-8

HS-900 036

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT

Administrative considerations, the Pursuit Driving Course Unit, instructor preparation activities, trainee knowledge and performance objectives, and individual course modules are described for the emergency vehicle operation (EVO) training program, which is designed as a practical, in-vehicle course. Trainees qualified to take this unit have completed the basic EVO Curriculum (Parts 1, 2, and 3). They should be authorized representatives of a law enforcement agency. Pursuit Driving instructors must be experienced and skilled in high-speed driving techniques. The class size should not exceed 12 trainees, and an instructor/trainee ratio 1:3 is most desirable. Facilities required include classroom(s), a skid pan, an oval track, a "high-speed" track, intersection area, and a vechicle maintenance area. The following types of vehicles are required: vehicles for high speed and oval track (with rollbars, reinforcements, and extra restraints), vehicles with "racing slicks" for skid pan use, emergency standby and "civilian" vehicles, and a large fire truck. Two 90-minute films pertaining to high-speed pursuit driving (or one film and Commentary Driving exercises) are required. Assuming the functional requirements are satisfied, the Pursuit Course requires two days. The course contains six modules, geared toward developing trainee skill in high-speed pursuit driving. Trainees will have an opportunity to practice and demonstrate their abilities on the skid pan, oval track, and high-speed track.

INNOVATRIX, Inc., Ingomar, Pa.
NHTSA-P.O.-9-6219
1979 ; 61p 33refs
Clearinghouse Training Materials. Subject: Law Enforcement Officer Pursuit Driving. Format: Instructor Manual. Type of Audience: Police Driver. See also HS-802 563, HS-802 564, and HS-803 669.
Availability: GPO, stock no. 050-003-00364-6

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INDEX to ABSTRACTS

blank page

KWOC Title Index

ABSOLUTE

EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA
HS-027 061

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT
HS-027 059

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT
HS-027 060

ACID

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

ACTION

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

SUMMARY OF NATIONAL ALCOHOL SAFETY ACTION PROJECTS
HS-804 032

ACTIONS

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

ACTUATOR

DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)
HS-027 122

ADAPTATION

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

ADHESIVES

ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

ADJUDICATION

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

ADMINISTRATIVE

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

ADVISORIES

EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

ADVISORY

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 007

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

AERIAL

HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK
HS-027 116

AFTERRUN

WHAT CAUSES ENGINE AFTERRUN?
HS-027 044

AGENCY

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE
HS-027 104

AGGRESSIVITY

VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION
HS-026 971

AIR

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT
HS-027 017

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

AIRBAGS

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

ALCOHOL

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990
HS-027 038

SUMMARY OF NATIONAL ALCOHOL SAFETY ACTION PROJECTS
HS-804 032

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

ALLIANCE

REMARKS BEFORE THE ALLIANCE OF AMERICA INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979
HS-810 357

ALLISON

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

ALTITUDE

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

ALUMINUM

MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

AMENDED

HIGHWAY SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE HIGHWAY SAFETY ACT OF 1966 AS AMENDED, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 372

AMERICA

REMARKS BEFORE THE ALLIANCE OF AMERICA INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979
HS-810 357

ANALYTICAL

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

ANALYZING

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

ANTITHEFT

PROPOSED PROGRAM IMPLEMENTATION PLA
FOR MOTOR VEHICLE REGISTRATION, TITLIN
AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 1

ARISE

GASOLINE SULFUR CONTROL MAY B
REQUIRED...OR SULFATE EMISSIONS PROBLEM
MAY ARISE WITH THREE-WAY CATALYST SY
TEMS
HS-027 0

ARROW

HUMAN FACTORS CONSIDERATIONS IN ARRO
BOARD DESIGN AND OPERATION
HS-027 1

ASSESSMENT

A TECHNIQUE FOR THE ASSESSMENT OF TH
FUEL-CONSERVATION POTENTIAL OF A GROUN
TRANSPORTATION SYSTEM
HS-027 0

ASSESSMENT OF VEHICLE SAFETY PROBLEM
FOR SPECIAL DRIVING POPULATIONS. FINA
REPORT
HS-804 9

ASSIGNMENT

A GRAPHICAL EXPLANATION OF THE TWO PRI
CIPLES AND TWO TECHNIQUES OF TRAFFIC A
SIGNMENT
HS-027 0

ASSOCIATION

MVMA (MOTOR VEHICLE MANUFACTURERS ASS
CIATION) MOTOR VEHICLE FACTS AND FIGUR
'79
HS-027 0

ASTRO

EXHAUST EMISSIONS AND FUEL CONSUMPTI
OF A HEAVY-DUTY DIESEL VEHICLE OVER VA
IOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 N
TECHNICAL REPORT
HS-027 0

ATTENUATION

AN ATTENUATION AND TRANSPORT DEL
MODEL FOR SINGLE POINT CLOSED-LOOP FU
METERING SYSTEMS
HS-027 0

ATTITUDES

TRAVELERS' ATTITUDES AND ENERGY CONSE
VATION
HS-027 0

AUTO

AN EMPIRICAL ANALYSIS OF BEHAVIORAL
TENTIONS OF SINGLE-OCCUPANT AUTO DRIVE
TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027

AUTOMATED

AUTOMATED STRUCTURAL BONDING SYSTE
FOR GRAPHITE AND OTHER HIGH-STRENG
COMPOSITES
HS-027

AUTOMOBILE

AUTOMOTIVE MANUFACTURERS' COST/REVEN
FINANCIAL AND RISK ANALYSIS: PROJECT

IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)
HS-805 269

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

AUTOMOBILES

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

AUTOMOTIVE

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)
HS-027 122

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

MODEL 44400 AUTOMOTIVE CRASH RECORDER.
HS-805 089

REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY
HS-027 095

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES
HS-026 975

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

AUTOMOTRIZ

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

AVAILABLE

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

AVENUES

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)
HS-805 269

BACK

STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)
HS-027 057

BACKGROUND

'STAR OF LIFE' EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

BARRICADES
EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

BASICS
STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)
HS-027 057

BATTERIES
LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

BATTERY
A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

ELECTRIC VEHICLE BATTERY DEVELOPMENT
HS-026 979

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT
HS-027 117

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

BEHAVIORAL
AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

BELT
AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

BILL
STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

BIOMASS
BIOMASS: THE SELF-REPLACING ENERGY RESOURCE
HS-027 036

BLENDING
EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES. STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

BLENDS
DIESEL-ETHANOL FUEL BLENDS INVESTIGATED
HS-027 043

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS TECHNICAL REPORT
HS-027 05

BOARD
HUMAN FACTORS CONSIDERATIONS IN ARROW BOARD DESIGN AND OPERATION
HS-027 12

BODY
HIGH-STRENGTH STEEL SHEETS FOR AUTC
MOBILE BODY PANELS
HS-027 09

MINIMIZING THE WEIGHT OF ALUMINUM BOD
PANELS
HS-027 09

REINFORCED REACTION INJECTION MOLDIN
PROCESS AND MATERIALS FOR AUTOMOTIV
BODY PANELS
HS-027 0

BONDING
ADHESIVES FOR THE BONDING OF GRAPHIT
GLASS COMPOSITES
HS-026 9

AUTOMATED STRUCTURAL BONDING SYSTEM
FOR GRAPHITE AND OTHER HIGH-STRENGT
COMPOSITES
HS-027 1

BOOK
FACT BOOK. STATISTICAL INFORMATION
HIGHWAY SAFETY
HS-804

BOSTON
REMARKS BEFORE THE ALLIANCE OF AMERI
INSURERS, BOSTON, MASSACHUSETTS, MAY
1979
HS-810

BRAZIL
HOW BRAZIL'S RAISING CANE OVER GASOLI
TARGET: 100% ALCOHOL FUEL BY 1990
HS-027

BROADCAST
HIGHWAY ADVISORY RADIO OPERATIONAL S
SURVEY AND BROADCAST EQUIPMENT GUI
FINAL REPORT
HS-027

BROTHERHOOD
REMARKS BEFORE THE WESTERN CONFEREN
CONVENTION OF THE INTERNATIONAL BROTH
HOOD OF TEAMSTERS, SEATTLE, WASHINGT
AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810

BULK
COMPARISON OF MODEL CALCULATIONS A
EXPERIMENTAL MEASUREMENTS OF THE B

CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

BURDEN

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

BUS

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT
HS-027 117

BUSES

ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

CALCULATIONS

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

CALIFORNIA

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES
HS-026 998

INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

CAMPAIGNS

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

CANE

HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990
HS-027 038

CAR

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

CARE

"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

CARS

AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY
HS-027 056

LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS
HS-027 000

CASE

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

CATALOG

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

CATALYST

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

CAUSATIVE

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

CAUSES

WHAT CAUSES ENGINE AFTERRUN?
HS-027 044

CENSUS

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

CHANNELIZING

EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

CHARACTERISTICS

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE

PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

CHEMICAL

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS
HS-027 041

CHILD

1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

CIM

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

CLASSIFICATION

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

CLOSED

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

COAL

THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL
HS-027 035

COLD

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK
HS-027 045

COLLISIONS

THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

COLORADO

EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT
HS-027 052

TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

COMBUSTION

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

COMFORT

AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

COMMERCIAL

EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

COMMITTEE

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

COMPANIES

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

COMPARATIVE

A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN
HS-026 999

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

COMPARISON

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

COMPLAINT

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)
HS-805 269

COMPLIANCE

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

COMPONENTS

ENGINE DESIGN EXPERIENCES AND DEVELOPMENT OF CRITICAL COMPONENTS
HS-027 054

COMPOSITES

ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

COMPOUND

INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

COMPREHENSIVE

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

COMPTROLLER

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

COMPUTER

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

CONCEPT

NEW-CONCEPT ALL TERRAIN UNDERCARRIAGE DESIGNED
HS-027 039

CONDITION

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

CONDITIONED

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

CONDITIONING

HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

CONFERENCE

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)
HS-027 012

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

CONGRESS

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

CONGRESSIONAL

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

CONSERVATION

A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM
HS-027 034

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

ENERGY CONSERVATION IN URBAN TRANSPORTATION
HS-027 021

ENERGY CONSERVATION--TECHNIQUES AND RESULTS
HS-027 030

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION
HS-027 029

TRANSPORTATION CONSERVATION: CAN WE DELIVER?
HS-027 013

TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE
HS-027 019

TRANSPORTATION ENERGY CONSERVATION PLAN
HS-027 027

TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS
HS-027 022

TRAVELERS' ATTITUDES AND ENERGY CONSERVATION
HS-027 018

CONSTRUCTION

EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION
HS-027 002

CONTINUOUSLY

CONTINUOUSLY VARIABLE TRANSMISSION HAS HIGH POWER DENSITY
HS-027 040

CONTRIBUTING

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977
HS-027 114

CONTROL

A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)
HS-027 097

A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES
HS-027 069

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE
HS-027 104

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

WORK ZONE TRAFFIC CONTROL
HS-027 128

CONVENIENCE

AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

CONVENTION

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

COPING

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

CORPORATE

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

COST

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 371

COSTS

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

COURSE

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

CRASH

ADVANCED CRASH RECORDER DEVELOPMENT IMPLEMENTATION PLAN
HS-805 08

CRASH INJURY PREDICTION MODEL HS-026 970

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT HS-805 047

MODEL 44400 AUTOMOTIVE CRASH RECORDER. HS-805 089

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS HS-804 773

CRITERIA

'STAR OF LIFE' EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA HS-803 721

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES HS-026 973

CUSTOMERS

INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES HS-026 968

CYCLE

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT HS-027 118

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS HS-026 972

CYCLES

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT HS-027 050

CYLINDER

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE HS-026 965

DAKOTA

1978 NORTH DAKOTA VEHICULAR ACCIDENT FACTS HS-026 962

DATE

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE HS-027 104

DEAL

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED. HS-803 966

DECREASE

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977 HS-027 114

DEFECT

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979 HS-804 884

DEFINE

DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE 'ACCIDENT' HS-027 079

DELAY

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS HS-027 098

DELINEATION

RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION HS-027 002

DELIVER

TRANSPORTATION CONSERVATION: CAN WE DELIVER? HS-027 013

DELIVERY

A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN HS-027 091

DENSITY

CONTINUOUSLY VARIABLE TRANSMISSION HAS HIGH POWER DENSITY HS-027 040

DEPARTMENT

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES HS-026 998

DESIGN

DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION) HS-027 122

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS HS-027 086

ENGINE DESIGN EXPERIENCES AND DEVELOPMENT OF CRITICAL COMPONENTS HS-027 054

HUMAN FACTORS CONSIDERATIONS IN ARROWBOARD DESIGN AND OPERATION HS-027 129

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL HS-027 124

SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES HS-026 975

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT HS-805 104

DETROIT

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

DEVICE

HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK
HS-027 116

DEVICES

EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

DIAGNOSTIC

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

DIARIES

USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

DIESEL

DIESEL-ETHANOL FUEL BLENDS INVESTIGATED
HS-027 043

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK
HS-027 045

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

DIRECT

240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

DISADVANTAGE

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

DISPLACEMENT

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

DISTANCE

A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES
HS-027 069

DISTRIBUTION

A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD
HS-027 068

DIVISION

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

DOOR

AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

DRINK

DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE 'ACCIDENT'
HS-027 079

DRINKING

DRINKING AND DRIVING ACCIDENTS–DOES EDUCATION HELP?
HS-027 115

DRIVABILITY

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

DRIVE

DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE 'ACCIDENT'
HS-027 079

DRIVER

AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

DRIVERS

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

DRIVING

ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

DRINKING AND DRIVING ACCIDENTS--DOES EDUCATION HELP?
HS-027 115

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

DROP

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

DRUGS

INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

DUTIES

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

DUTY

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

ECONOMY

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

EDGE

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

EDUCATION

AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

DRINKING AND DRIVING ACCIDENTS--DOES EDUCATION HELP?
HS-027 115

EFFECTIVENESS

EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA
HS-027 061

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

EFFICIENCIES

TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES
HS-027 032

EFFICIENCY

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

ENERGY EFFICIENCY: WHICH MODES, WHICH PROGRAMS?
HS-027 014

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

EFFICIENT

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

EGR

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK
HS-027 045

ELDERLY

USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

ELECTRIC

A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

ELECTRIC VEHICLE BATTERY DEVELOPMENT
HS-026 979

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

ELECTRICAL

PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

ELECTRONIC

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

EMERGENCIES

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED.
HS-803 966

EMERGENCY

"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

EMISSION

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

EMISSIONS

DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

EMPIRICAL

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

EMPLOYEE

THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM
HS-027 031

ENERGY

A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

BIOMASS: THE SELF-REPLACING ENERGY RESOURCE
HS-027 036

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

ENERGY CONSERVATION IN URBAN TRANSPORTATION
HS-027 021

ENERGY CONSERVATION–TECHNIQUES AND RESULTS
HS-027 030

ENERGY EFFICIENCY: WHICH MODES, WHICH PROGRAMS?
HS-027 014

ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

ENERGY TRANSPORTATION STUDIES AND RELATED ISSUES
HS-027 015

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION
HS-027 029

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE
HS-027 019

TRANSPORTATION ENERGY CONSERVATION PLAN
HS-027 027

TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS
HS-027 022

TRAVELERS' ATTITUDES AND ENERGY CONSERVATION
HS-027 018

ENFORCEMENT

INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

ENGINE

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

ENGINE DESIGN EXPERIENCES AND DEVELOPMENT OF CRITICAL COMPONENTS
HS-027 054

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

WHAT CAUSES ENGINE AFTERRUN?
HS-027 044

ENGINES

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PER-

FORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

ENGLISH

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

ENVIRONMENTAL

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE
HS-027 104

EPA

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE
HS-027 104

EQUIPMENT

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

ESCAPE

FIELD TESTING A TRUCK ESCAPE RAMP
HS-027 078

ESPANOL

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

ETHANOL

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

DIESEL-ETHANOL FUEL BLENDS INVESTIGATED
HS-027 043

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY-STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

EUROPEAN

REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY
HS-027 095

EVALUATION

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT
HS-027 052

EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION
HS-026 971

EXAMINATION

AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

EXCESSIVE

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

EXECUTIVE

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANAL-

YSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 007

EXHAUST

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK
HS-027 045

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

EXHAUST TUNING
HS-027 055

EXPENSIVE

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

EXPERIENCES

ENGINE DESIGN EXPERIENCES AND DEVELOPMENT OF CRITICAL COMPONENTS
HS-027 054

EXPERIMENTAL

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

EXPLANATION

A GRAPHICAL EXPLANATION OF THE TWO PRINCIPLES AND TWO TECHNIQUES OF TRAFFIC ASSIGNMENT
HS-027 075

FARS

THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

FATAL

ANALYSIS OF FATAL ACCIDENT TRENDS ON MARYLAND HIGHWAYS, 1970-1976
HS-027 001

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS
HS-804 773

THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

FATALITIES

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977
HS-027 114

FEASIBILITY

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

FEDERAL

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

FIELD

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

FIELD TESTING A TRUCK ESCAPE RAMP
HS-027 078

FIGURES

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79
HS-027 070

FINANCIAL

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

FIRE

OFF-HIGHWAY FIRE PROTECTION: CURRENT TRENDS
HS-027 042

FISCAL

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984
HS-805 116

FLEETS

LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS
HS-027 000

FLOW

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

FLYWHEEL

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

FORCE

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

FOREIGN

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

FOUNDATION

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

FREE

A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD
HS-027 068

FREEWAY

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

FREEWAYS

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT. PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

FRICTION

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS
HS-027 046

FUEL

A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)
HS-027 097

A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM
HS-027 034

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

DIESEL-ETHANOL FUEL BLENDS INVESTIGATED
HS-027 043

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

FUEL FOR THOUGHT
HS-027 005

HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990
HS-027 038

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

FUELED

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

FUELS

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

FUNCTION

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

GAINED

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

GAS

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK
HS-027 045

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES
HS-026 975

THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL
HS-027 035

GASOLINE

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990
HS-027 038

GEOMETRY

STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)
HS-027 057

GEORGIA

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

GERMANY

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

GIVES

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

GLASS

ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

GLOSARIO

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

GLOSSARY

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

GMC

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

GOODBYE

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

GOODS

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

GRAPHICAL

A GRAPHICAL EXPLANATION OF THE TWO PRINCIPLES AND TWO TECHNIQUES OF TRAFFIC ASSIGNMENT
HS-027 075

GRAPHITE

ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

GREATER

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

GROUND

A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM
HS-027 034

GROUPS

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

GUIDANCE

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

GUIDE

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)
HS-805 269

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

HANDICAPPED

USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

HEATING

HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

HEAVY

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

HELD

THE NATIONAL ACCIDENT SAMPLING SYSTEM MEETING HELD OCTOBER 16-17, 1978
HS-804 888

HELMET

EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

HELP

DRINKING AND DRIVING ACCIDENTS--DOES EDUCATION HELP?
HS-027 115

HIGHWAY

BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY
HS-027 056

FACT BOOK. STATISTICAL INFORMATION ON HIGHWAY SAFETY
HS-804 030

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT
HS-803 805

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

HIGHWAY SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE HIGHWAY SAFETY ACT OF 1966 AS AMENDED, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 372

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

OFF-HIGHWAY FIRE PROTECTION: CURRENT TRENDS
HS-027 042

PREDICTION OF HIGHWAY TRAFFIC NOISE
HS-027 003

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

HIGHWAYS

ANALYSIS OF FATAL ACCIDENT TRENDS ON MARYLAND HIGHWAYS, 1970-1976
HS-027 001

HISTORICAL

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

HOME

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

HUMAN

HUMAN FACTORS CONSIDERATIONS IN ARROW-BOARD DESIGN AND OPERATION
HS-027 129

IGNITION

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS
HS-027 041

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES: A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

IMPACT

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

IMPACTS

ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

IMPLEMENTATION

ADVANCED CRASH RECORDER DEVELOPMENT. IMPLEMENTATION PLAN
HS-805 088

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984
HS-805 116

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

IMPROVE

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS
HS-027 046

IMPROVEMENT

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT
HS-027 017

INCOME

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

INCREASED

INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

INDOLENE

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

INDUSTRIAL

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

INDUSTRY

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY
HS-027 095

INFLATABLE

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

INFORMATION
CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)
HS-805 269
EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053
FACT BOOK. STATISTICAL INFORMATION ON HIGHWAY SAFETY
HS-804 030
INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886
MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978–DECEMBER 31, 1978
HS-803 371
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 007

INGLES
GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

INJECTION
CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093
REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

INJURY
CRASH INJURY PREDICTION MODEL
HS-026 970
FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

INNOVATIVE
INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

INSITITUTIONS
TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION
HS-027 029

INSPECTION
EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT
HS-027 052
THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

INSTITUTIONAL
TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS
HS-027 022

INSURERS
REMARKS BEFORE THE ALLIANCE OF AMERICA INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979
HS-810 357

INTEGRATED
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

INTEGRITY
PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

INTENTIONS
AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

INTERNAL
POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITER-ENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

INTERNATIONAL
REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHER-

HOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

INTERSECTIONS
ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

INTERVIEW
DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

INTERVIEWS
WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

INVESTIGATED
DIESEL-ETHANOL FUEL BLENDS INVESTIGATED
HS-027 043

INVESTIGATION
PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

INVESTIGATORY
THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO
HS-027 076

INVOLVEMENT
ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5
HS-026 966

ISSUES
ENERGY TRANSPORTATION STUDIES AND RELATED ISSUES
HS-027 015

KG
A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

KM
EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA
HS-027 061

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT
HS-027 059

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT
HS-027 060

KNOCK
EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK
HS-027 045

LANES
FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

LAP
SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

LAW
EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

LAWS
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

LEAD
LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

LENGTH
EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

LESSORS
LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS
HS-027 000

LICENSING
AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

LIFE
"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

LIGHT

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS

HS-027 041

LIGHT VEHICLE TECHNOLOGY SUBSITUTION

HS-027 020

LIKELY

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT

HS-804 915

LIMIT

EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA

HS-027 061

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT

HS-803 805

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979

HS-810 359

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT

HS-027 059

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT

HS-027 060

LIMITATIONS

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION

HS-027 058

LINEAR

DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)

HS-027 122

LITERATURE

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT

HS-805 035

LITHIUM

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE

HS-027 089

LITTLE

BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY

HS-027 056

LOADS

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS

HS-027 041

LONGER

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES

HS-027 127

LONGITUDINAL

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY

HS-027 133

LOOP

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS

HS-027 098

LOUIS

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT

HS-805 104

LOW

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS

HS-027 025

MAINTENANCE

EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT

HS-027 052

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES

HS-027 134

MANAGEMENT

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES

HS-027 134

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT

HS-805 047

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE

HS-027 089

MANDATES

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS

HS-027 066

MANDATORY

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.

HS-804 088

MANUAL

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

MANUFACTURER

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

MANUFACTURERES

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914

MANUFACTURERS

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79
HS-027 070

MANUFACTURING

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

MARKERS

RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION
HS-027 002

MARKET

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

MARKETING

AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

MARKINGS

EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

MARYLAND

ANALYSIS OF FATAL ACCIDENT TRENDS ON MARYLAND HIGHWAYS, 1970-1976
HS-027 001

MASSACHUSETTS

REMARKS BEFORE THE ALLIANCE OF AMERICA INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979
HS-810 357

MATERIALS

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

MATERIALS IN THE '80 MODELS
HS-027 037

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

MAXIMUM

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT
HS-803 805

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

MEASUREMENT

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION
HS-026 971

MEASUREMENTS

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK

CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

MEASURING

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

MECHANIZED

MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE
HS-026 977

MEDICAL

'STAR OF LIFE' EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

MESSAGE

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

METAL

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

METERING

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

METHANOL

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

METHOD

A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD
HS-027 068

METHODOLOGY

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

METHODS

AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

METROPOLITAN

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

MEXICO

THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO
HS-027 076

MICHIGAN

A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN
HS-026 999

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

MICROPROCESSOR

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

MIDDLE

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

MILEAGE

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS
HS-027 046

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

MILES

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5
HS-026 966

MINIMIZING

MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

MOBILE

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

MODEL

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

CRASH INJURY PREDICTION MODEL
HS-026 970

EVALUATING THE PERFORMANCE OF A SIMULATION MODEL (TRAFFIC ANALYSIS)
HS-027 073

MODEL 44400 AUTOMOTIVE CRASH RECORDER.
HS-805 089

MODELS

MATERIALS IN THE '80 MODELS
HS-027 037

THE USE OF MULTIPLICATIVE MODELS FOR ANALYSIS OF ROAD SAFETY DATA
HS-026 967

MODES

ENERGY EFFICIENCY: WHICH MODES, WHICH PROGRAMS?
HS-027 014

MODIFIERS

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS
HS-027 046

MOGLICHKEITEN

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

MOLDING

CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

MONITORING

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

MOPED

THE MOPED REPORT
HS-027 010

MOPEDS

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

MOTOR

A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES
HS-027 069

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES
HS-026 998

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977
HS-027 114

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED.
HS-803 966

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 371

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79
HS-027 070

PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO
HS-027 076

MOTORCYCLE

EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

MOTORCYCLES

STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)

HS-027 057

MOTORED

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE

HS-026 965

MOTORISTS

MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES

HS-026 964

MULTICYLINDER

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL

HS-027 063

MULTIPLICATIVE

THE USE OF MULTIPLICATIVE MODELS FOR ANALYSIS OF ROAD SAFETY DATA

HS-026 967

MVMA

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79

HS-027 070

NA

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT

HS-027 050

NATION

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA

HS-027 033

NATIONAL

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT

HS-803 805

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979

HS-804 884

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978

HS-803 371

NATIONAL ACCIDENT SAMPLING SYSTEM. PILOT STUDY. FINAL REPORT

HS-804 909

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS

HS-804 773

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE

HS-804 313

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979

HS-810 359

SUMMARY OF NATIONAL ALCOHOL SAFETY ACTION PROJECTS

HS-804 032

THE NATIONAL ACCIDENT SAMPLING SYSTEM MEETING HELD OCTOBER 16-17, 1978

HS-804 888

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS

HS-804 852

NATURAL

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979

HS-810 359

NEWS

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)

HS-810 356

NITRIC

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS

HS-026 972

NITROGEN

A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)

HS-027 097

NMSL

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT

HS-803 805

NOISE

EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE

HS-027 104

PREDICTION OF HIGHWAY TRAFFIC NOISE

HS-027 003

NONLINEAR

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING

HS-027 126

NOX

A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)
HS-027 097

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

OCCUPANCY

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES
HS-027 032

OCCUPANT

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

OCCURRING

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

OFFENSES

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

OFFICERS

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

OFFS

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

OIL

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS
HS-027 046

THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL
HS-027 035

OLDS

AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

OPERATION

COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

HUMAN FACTORS CONSIDERATIONS IN ARROWBOARD DESIGN AND OPERATION
HS-027 129

THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

OPERATIONAL

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

OPERATIONS

EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

OPTIMIZATION

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

ORGANIC

CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

OTTOMOTOR

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

OVERALL

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

OVERVIEW
A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

OXIDE
DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

OXIDES
A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)
HS-027 097

PACKAGE
MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE
HS-026 977

PANELS
HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

PAPER
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

PART
EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5
HS-026 966

PASSENGER
AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

PASSING
PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

PAVED
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

PAVEMENT
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION
HS-027 002

PAYLOAD
A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

PEDESTRIAN
A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

PENNSYLVANIA
THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

PERCEPTION
ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

PERFORMANCE
EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

EVALUATING THE PERFORMANCE OF A SIMULATION MODEL (TRAFFIC ANALYSIS)
HS-027 073

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

PERSONALITY

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

PERSPECTIVE

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

PHARMACIES

INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

PHASES

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PHYSICAL

CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

PILOT

NATIONAL ACCIDENT SAMPLING SYSTEM. PILOT STUDY. FINAL REPORT
HS-804 909

PLAN

ADVANCED CRASH RECORDER DEVELOPMENT. IMPLEMENTATION PLAN
HS-805 088

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984
HS-805 116

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

TRANSPORTATION ENERGY CONSERVATION PLAN
HS-027 027

PLANNING

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)
HS-027 012

TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT
HS-027 017

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

PLASTICS

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

POLICY

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

POLYESTER

REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY
HS-027 095

POOLING

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

POPULATIONS

ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

POWER

CONTINUOUSLY VARIABLE TRANSMISSION HAS HIGH POWER DENSITY
HS-027 040

PRACTICE

AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

PREDICT

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

PREDICTION

CRASH INJURY PREDICTION MODEL
HS-026 970

PREDICTION OF HIGHWAY TRAFFIC NOISE
HS-027 003

PRELIMINARY

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS
HS-804 773

PRIMARY

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

PRINCIPLES

A GRAPHICAL EXPLANATION OF THE TWO PRINCIPLES AND TWO TECHNIQUES OF TRAFFIC ASSIGNMENT
HS-027 075

PROBLEM

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

PROBLEMS

ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

PROCEDURES

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

PROCEEDINGS

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

PROCESS

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

PROCESSES

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

PROCO

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

PROGRAMMED

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

PROGRAMMING

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

PROJECTED

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

PROJECTS

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

SUMMARY OF NATIONAL ALCOHOL SAFETY ACTION PROJECTS
HS-804 032

PROMOTE

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS
HS-027 041

PROPERTIES
CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT HS-027 093

PROPOSALS
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION HS-027 058

PROTECTION
EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE HS-027 104
OFF-HIGHWAY FIRE PROTECTION: CURRENT TRENDS HS-027 042

PROVIDE
STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979 HS-810 359

PUBLIC
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION HS-027 058

PURSUIT
TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT HS-900 036

QUALITY
TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT HS-027 017

RADICALS
CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS HS-027 041

RADIO
EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT HS-027 053
HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT HS-027 119

RAISED
RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION HS-027 002

RAISING
HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990 HS-027 038

RAMP
FIELD TESTING A TRUCK ESCAPE RAMP HS-027 078

RATES
TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES HS-027 032

RATIO
VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS HS-027 065

REACTION
CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT HS-027 093
REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS HS-027 092

READER
TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY HS-027 004

RECALL
MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979 HS-804 884

RECEIVED
INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES HS-026 968

RECIRCULATION
EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK HS-027 045

RECOMMENDATIONS
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION HS-027 058

RECORDER
ADVANCED CRASH RECORDER DEVELOPMENT. IMPLEMENTATION PLAN HS-805 088
MODEL 44400 AUTOMOTIVE CRASH RECORDER. HS-805 089

RECORDS
PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984 HS-805 116

REDUCE

EGR (EXHAUST GAS RECIRCULATION) CAN REDUCE DIESEL COLD KNOCK

HS-027 045

REDUCED

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT

HS-027 007

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT

HS-027 099

REDUCTIONS

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS

HS-027 046

REFERENCE

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE

HS-027 006

REFINEMENTS

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)

HS-027 071

REFRESHER

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.

HS-900 034

REGIONAL

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY

S-027 081

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT

HS-803 805

REGISTRATION

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION. TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984

HS-805 117

REGULATED

EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS

HS-027 064

REGULATION

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979

HS-810 359

REGULATIONS

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT

HS-804 915

REINFORCED

REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY

HS-027 095

REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS

HS-027 092

REINFORCEMENT

CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT

HS-027 093

RELATIVE

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL

HS-027 063

REMOVAL

TRAFFIC STRIPE REMOVAL

HS-027 137

REPLACING

BIOMASS: THE SELF-REPLACING ENERGY RESOURCE

HS-027 036

REQUIREMENTS

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS

HS-804 852

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT

HS-027 131

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT

HS-027 048

RESEARCH

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES

HS-026 998

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA

HS-027 082

RESOURCE

BIOMASS: THE SELF-REPLACING ENERGY RESOURCE

HS-027 036

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)

HS-805 269

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

RESOURCES

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

RESPONDERS

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

RESTRAINT

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

RESULTS

ENERGY CONSERVATION--TECHNIQUES AND RESULTS
HS-027 030

REVENUE

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

REVIEW

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

REVISED

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED.
HS-803 966

REVISION

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

RIM

CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

RISING

BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY
HS-027 056

RISK

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

ROAD

A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD
HS-027 068

ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5
HS-026 966

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL
HS-027 035

THE USE OF MULTIPLICATIVE MODELS FOR ANALYSIS OF ROAD SAFETY DATA
HS-026 967

ROUGH

THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL
HS-027 035

ROUTING

ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

SAFE

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

SAMPLE

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

SAMPLING

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

NATIONAL ACCIDENT SAMPLING SYSTEM. PILOT STUDY. FINAL REPORT
HS-804 909

THE NATIONAL ACCIDENT SAMPLING SYSTEM MEETING HELD OCTOBER 16-17, 1978
HS-804 888

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

SAVINGS

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 371

SCHEDULE

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

SCHEDULING

ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

SCHOOL

ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

SEARCH

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

SEAT

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

SEATTLE

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

SECRETARY

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

SELF

BIOMASS: THE SELF-REPLACING ENERGY RESOURCE
HS-027 036

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS
HS-027 041

SENATE

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

SERVICES

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

SEVERITY

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS
HS-804 773

SHEET

INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

SHEETS

HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

SHIFT

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS
HS-027 000

SI

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

SIDE

AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

SIGNS

PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

SIMULATION

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

EVALUATING THE PERFORMANCE OF A SIMULATION MODEL (TRAFFIC ANALYSIS)
HS-027 073

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT
HS-027 117

SINGLE

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

SITE

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

SIZE

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

SLED

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

SMALL

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

SMALLER

LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS
HS-027 000

SOFTWARE

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

SOURCE

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

SPANISH

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

SPARK

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

SPECIALTY

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

SPECIFICATIONS

"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

SPEED

A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD
HS-027 068

EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA
HS-027 061

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT
HS-803 805

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 007

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT
HS-027 059

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT
HS-027 060

STABILITY
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

STANDARD
AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

STAR
"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

STATEMENT
STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

STATES
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

STATISTICAL
FACT BOOK. STATISTICAL INFORMATION ON HIGHWAY SAFETY
HS-804 030

STEADY
EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

STEEL
HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

STEERING
STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)
HS-027 057

STEP
DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)
HS-027 122

STOCKTON
INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

STOP
THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO
HS-027 076

STORAGE
ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

STRATEGIES
CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

STRATEGY
A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES
HS-027 069

STRENGTH
AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

STRIPE
TRAFFIC STRIPE REMOVAL
HS-027 137

STROKE

CHEMICAL RADICALS PROMOTE TWO-STROKE SELF-IGNITION AT LIGHT LOADS
HS-027 041

STRUCTURAL

AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

SUBCOMMITTEE

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

SUBSITUTION

LIGHT VEHICLE TECHNOLOGY SUBSITUTION
HS-027 020

SULFATE

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

SULFIDE

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

SULFUR

GASOLINE SULFUR CONTROL MAY BE REQUIRED...OR SULFATE EMISSIONS PROBLEMS MAY ARISE WITH THREE-WAY CATALYST SYSTEMS
HS-027 047

SUPPLEMENT

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

SUPPORT

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

SURFACE

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

SURVEY

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

SURVEYS

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

SYMBOL

"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

SYNTHESIS

SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)
HS-027 012

TAKING

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

TAPER

EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

TARGET

HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990
HS-027 038

TASK

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

TAXES

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

TEAMSTERS

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

TECHNICIAN

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

TECHNOLOGY

LIGHT VEHICLE TECHNOLOGY SUBSITUTION
HS-027 020

TENNESSEE

1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

TERMINOLOGIA

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

TERMINOLOGY

GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

TERRAIN

NEW-CONCEPT ALL TERRAIN UNDERCARRIAGE DESIGNED
HS-027 039

TESTED

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

TESTING

FIELD TESTING A TRUCK ESCAPE RAMP
HS-027 078

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

TESTS

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

THEN

DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE "ACCIDENT"
HS-027 079

THERMAL

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

THOUGHT

FUEL FOR THOUGHT
HS-027 005

TIME

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

TITLING

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

TOOLS

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

TRACK

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

TRAFFIC

A GRAPHICAL EXPLANATION OF THE TWO PRINCIPLES AND TWO TECHNIQUES OF TRAFFIC ASSIGNMENT
HS-027 075

ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

EVALUATING THE PERFORMANCE OF A SIMULATION MODEL (TRAFFIC ANALYSIS)
HS-027 073

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 371

MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

PREDICTION OF HIGHWAY TRAFFIC NOISE
HS-027 003

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984
HS-805 116

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

TRAFFIC STRIPE REMOVAL
HS-027 137

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

WORK ZONE TRAFFIC CONTROL
HS-027 128

TRAINING

FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

TRANSIT

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

TRANSMISSION

CONTINUOUSLY VARIABLE TRANSMISSION HAS HIGH POWER DENSITY
HS-027 040

TRANSPORT

AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES
HS-027 032

TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION
HS-027 029

TRANSPORTATION

A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM
HS-027 034

APPLICATIONS AND USE OF TRANSPORTATION DATA
HS-027 080

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

ENERGY CONSERVATION IN URBAN TRANSPORTATION
HS-027 021

ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

ENERGY TRANSPORTATION STUDIES AND RELATED ISSUES
HS-027 015

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)
HS-027 012

THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM
HS-027 031

THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

TRANSPORTATION CONSERVATION: CAN WE DELIVER?
HS-027 013

TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE
HS-027 019

TRANSPORTATION ENERGY CONSERVATION PLAN
HS-027 027

TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS
HS-027 022

TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT
HS-027 017

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

TRAVEL

DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

TRAVELERS

TRAVELERS' ATTITUDES AND ENERGY CONSERVATION
HS-027 018

TRAVELLED

ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5
HS-026 966

TRENDS

ANALYSIS OF FATAL ACCIDENT TRENDS ON MARYLAND HIGHWAYS, 1970-1976
HS-027 001

OFF-HIGHWAY FIRE PROTECTION: CURRENT TRENDS
HS-027 042

TRUCK

A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN
HS-026 999

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

FIELD TESTING A TRUCK ESCAPE RAMP
HS-027 078

HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK
HS-027 116

TRUCKING

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

TRUCKS

BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY
HS-027 056

MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE
HS-026 977

TUBULAR

A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

TUNING

EXHAUST TUNING
HS-027 055

TURBINE

FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

TURBINES

SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES
HS-026 975

TWIST

TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

UNDERCARRIAGE

NEW-CONCEPT ALL TERRAIN UNDERCARRIAGE DESIGNED
HS-027 039

UNIT

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

UNITED

AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

URBAN

ENERGY CONSERVATION IN URBAN TRANSPORTATION
HS-027 021

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT
HS-027 117

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

URETHANES

CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

URGE

LESSORS URGE FLEETS TO SHIFT TO SMALLER CARS
HS-027 000

US

DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE "ACCIDENT"
HS-027 079

USAGE

EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

UTILITY

HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK
HS-027 116

MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE
HS-026 977

VAN

A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

VARIABLE

CONTINUOUSLY VARIABLE TRANSMISSION HAS HIGH POWER DENSITY
HS-027 040

VARIATIONS

VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

VARTA

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

VDC

240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

VEHICLE

ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

ELECTRIC VEHICLE BATTERY DEVELOPMENT
HS-026 979

EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977
HS-027 114

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED.
HS-803 966

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

LIGHT VEHICLE TECHNOLOGY SUBSITUTION
HS-027 020

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 371

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79
HS-027 070

PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT
HS-027 117

THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES
HS-027 032

VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION
HS-026 971

240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

VEHICLES

A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES
HS-027 069

AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

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ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES
HS-026 998

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO
HS-027 076

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

VEHICULAR

1978 NORTH DAKOTA VEHICULAR ACCIDENT FACTS
HS-026 962

VERIFICATION

SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

VICTORIA

EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA
HS-027 061

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT
HS-027 059

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT
HS-027 060

VIOLATIONS

ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

VISCOSITY

OIL FRICTION MODIFIERS IMPROVE MILEAGE MORE THAN VISCOSITY REDUCTIONS
HS-027 046

VISIBILITY

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 007

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

VOLT

240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

VOLUME

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

WARNING

EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

WARRANTS

PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

WASHINGTON

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

WEIGHT

EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

WEITERENTWICKLUNG

POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

WESTERN

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

IRKUNGSGRADVERBESSERUNG
POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG) HS-027 071

ORK
VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT HS-027 131
VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT HS-027 048
WORK ZONE TRAFFIC CONTROL HS-027 128

ORKPLACE
WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA HS-027 085

ORKSHOPS
FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT HS-803 805

ORLD
REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY) HS-810 356

ORRY
BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY HS-027 056

ORK
TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE HS-027 019

ONE
RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION HS-027 002
VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT HS-027 048
WORK ZONE TRAFFIC CONTROL HS-027 128

ONES
EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES HS-027 132
PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT HS-027 102
VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT HS-027 131

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Author Index

Akcelik, Rahmi
A GRAPHICAL EXPLANATION OF THE TWO PRINCIPLES AND TWO TECHNIQUES OF TRAFFIC ASSIGNMENT
HS-027 075

Apodaca, Edward J.
THE INVESTIGATORY STOP OF MOTOR VEHICLES IN NEW MEXICO
HS-027 076

Atabak, Ali
A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN
HS-026 999

Avin, U. P.
A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100
A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101
A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

Bailey, Richard L.
MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE
HS-026 977

Barney, D. L.
THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

Barry, Timothy M.
PREDICTION OF HIGHWAY TRAFFIC NOISE
HS-027 003

Bayer, Anthony R. , Jr.
SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

Becker, Harold S.
CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914
CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915
CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916
CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

Beers, Jinx
MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

Bejma, Thomas C.
EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT
HS-027 052

Bellomo, S.
DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

Bellomo, Salvatore
SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)
HS-027 012

Beltrami, Edward
ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

Berman, Lon
ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

Bernazani, Paul
PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

Bers, Eric L.
TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES
HS-027 032

Berwager, Sydney W.
TRANSPORTATION CONSERVATION: CAN WE DELIVER?
HS-027 013

Bhajandas, A.
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

Bishop, Edward W.
FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

Blackadar, Thomas
EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

Blumberg, Paul N.
AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

Bodin, Lawrence D.
ROUTING AND SCHEDULING OF SCHOOL BUSES BY COMPUTER
HS-027 067

Bortz, Alfred B.
THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

Brach, P.
DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

Braden, Patricia L.
AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

Bradley, Stephen P.
AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

Branston, David
A METHOD OF ESTIMATING THE FREE SPEED DISTRIBUTION FOR A ROAD
HS-027 068

Bruck, H. W.
LIGHT VEHICLE TECHNOLOGY SUBSITUTION
HS-027 020

Bryant, Thos L.
FUEL FOR THOUGHT
HS-027 005

Bylinsky, Gene
BIOMASS: THE SELF-REPLACING ENERGY RESOURCE
HS-027 036

Canup, William C.
CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

Carlson, W. L.
AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

Carlson, William L.
CRASH INJURY PREDICTION MODEL
HS-026 970

Carroll, T. Owen
ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

Chambers, Charles L.
THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

Chan, Yupo
THE NATION'S TRANSPORTATION ENERGY CONSERVATION PLAN: A CASE STUDY OF PENNSYLVANIA
HS-027 033

Chavez, Edward
INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

Chilenskas, A. A.
THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

Christiansen, Dennis L.
URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

Christophe, Ch.
EXHAUST TUNING
HS-027 055

Claybrook, Joan
REMARKS BEFORE THE ALLIANCE OF AMERICA INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979
HS-810 357

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

Cleven, Arlene M.
FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

Cohen, A. I.
ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

Cohen, Stephen L.
ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

Cowley, J. E.
EFFECTIVENESS OF THE 100 KM/H ABSOLUTE SPEED LIMIT IN VICTORIA
HS-027 061

Crawshaw, James R.
DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)
HS-027 122

Crenca, Jack
PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

Crowell, William H.
TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE
HS-027 019

Culler, Carol J.
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Cumberledge, G.
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

Daly, Jack
ENERGY TRANSPORTATION STUDIES AND RELATED ISSUES
HS-027 015

Dare, James W.
TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

Davis, G. C.
COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

Dawson, Harry S. , Jr.
ANALYSIS OF FATAL ACCIDENT TRENDS ON MARYLAND HIGHWAYS, 1970-1976
HS-027 001

Deakin, Elizabeth A.
TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION
HS-027 029

Dobson, Ricardo
AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

Dorsey, Warren F.
HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

Dudek, Conrad L.
FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

Dunphy, Robert T.
TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

Durrett, Charles D. , Jr.
SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

Ecklund, E. E.
VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

Ellis, William
AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

Epel, Joseph N.
ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

Essenhigh, Robert H.
EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

Euler, Gary W.
ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

Farahat, M. M.
THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

Fee, D.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Ferlis, Robert A.
FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY
HS-027 081

Fisher, R. Fred
GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

Flanigan, Eugene E.
FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

Fleischmann, Charles W.
ELECTRIC VEHICLE BATTERY DEVELOPMENT
HS-026 979

Fleming, Al
HOW BRAZIL'S RAISING CANE OVER GASOLINE. TARGET: 100% ALCOHOL FUEL BY 1990
HS-027 038

Foldvary, L. A.
ROAD ACCIDENT INVOLVEMENT PER MILES TRAVELLED--PART 5
HS-026 966

Fowler, Paul
MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

Geiss, Linda
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Goeddel, D. L.
ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

Goode, Curtis
EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

Goodman, S. R.
HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

Grane, J. A. E.
THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

Graham, Jerry L.
EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

Gramling, W. L.
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

Green, Molly A.
ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

Guha, Probir K.
ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

Hablitzel, Herman
REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY
HS-027 095

Hall, Dana L.
ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

Hannon, Roseann
INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

Hartig, Fritz
POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

Harwood, Douglas W.
EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

Hause, Janet
INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

Heglund, C. Todd
THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM
HS-027 031

Heiss, W.
STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

Henderson, Naomi
AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

Herbein, W. C.
MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

Heywood, J. B.
DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

Higgins, J. M.
DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

Hockel, Knut
POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

Hofmann, Reinhard
POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

Hopkins, J. G. , 3rd.
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

Horowitz, Joel
TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT
HS-027 017

Hughes, Elizabeth C.
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Hulbert, Slade
MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

Hunter, William W.
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

Idanpaan-Heikkila, J.
INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

Isomeri, J.
INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

Jones, K. R.
240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

Kagan, L. S.
A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

Kahane, Charles Jesse
AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

Kaiser, Robert
AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

Kaplan, Richard
THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

Karnani, Aneel G.
AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

Katz, Diane B.
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

Kaufman, R.
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

Kelsey, Shara Lynn , comp.
CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES
HS-026 998

Kent, J. C.
COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

Khasnabis, Snehamay
A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN
HS-026 999

Kinstlinger, Jack
TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

Kleiman, L. A.
SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

Klingberg, Carl L.
SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

Knaff, R.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Knapp, Beverly G.
EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

HUMAN FACTORS CONSIDERATIONS IN ARROW-BOARD DESIGN AND OPERATION
HS-027 129

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

Knoblauch, R. I.
PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

Knoblauch, R. L.
PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

Koehler, Myron
EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

Koenig, H.
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

Kohler, U.
A STRATEGY FOR DISTANCE CONTROL OF MOTOR VEHICLES
HS-027 069

Kohn, Alexander R.
TRANSPORTATION ENERGY CONSERVATION PLAN
HS-027 027

Koppa, Rodger J.
ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

Kulash, Damian J.
ENERGY EFFICIENCY: WHICH MODES, WHICH PROGRAMS?
HS-027 014

Kuzmyak, J. Richard
USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

Lee, Joe
A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM
HS-027 034

Lester, Martha S.
TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

Liff, Sally D.
TRAVELERS' ATTITUDES AND ENERGY CONSERVATION
HS-027 018

Linnoila, M.
INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

Livingston, C.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Lo, Mark
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Loo, Robert
ROLE OF PRIMARY PERSONALITY FACTORS IN THE PERCEPTION OF TRAFFIC SIGNS AND DRIVER VIOLATIONS AND ACCIDENTS
HS-026 969

Lunn, Eugene
THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

MacGregor, C. J.
CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

Maki, M.
INFORMATION CONCERNING DRUGS AND DRIVING RECEIVED BY CUSTOMERS OF PHARMACIES
HS-026 968

Maloney, Lawrence
BIG TRUCKS, LITTLE CARS: RISING HIGHWAY WORRY
HS-027 056

Marshak, Seymour
AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

Mason, Anthony K.
ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

Masten, Frank
ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

Mayr, Bertold
POSSIBLE REFINEMENTS IN THE INTERNAL COMBUSTION ENGINE FOR IMPROVEMENT OF ITS EFFICIENCY (MOGLICHKEITEN DER WEITERENTWICKLUNG AM OTTOMOTOR ZUR WIRKUNGSGRADVERBESSERUNG)
HS-027 071

Mcgee, Hugh W.
VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

Mcknight, A. James
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884

McDonald, M.
DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

McGee, Hugh W.
VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

McKinstry, Herbert
EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

McKnight, A. James
ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885

McLachlan, C. J.
HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

McLaughlin, Mary , ed.
APPLICATIONS AND USE OF TRANSPORTATION DATA
HS-027 080

McShane, William R.
TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE
HS-027 019

Mehra, J.
DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

Mercure, Robert A.
SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES
HS-026 975

Moore, W. , Jr.
PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

Mould, P. R.
HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

Nichols, J.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Nichols, J. L.
AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

Nicotera, R. M.
PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT
HS-027 121

Niessner, Charles W.
RAISED PAVEMENT MARKERS FOR CONSTRUCTION ZONE DELINEATION
HS-027 002

TRAFFIC STRIPE REMOVAL
HS-027 137

Nigro, Daniel N.
FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

Noettl, John N.
THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

Norbye, Jan
TURBINE WITH A NEW TWIST. GOODBYE TO PROBLEMS WITH EMISSIONS, MILEAGE AND DRIVABILITY?
HS-027 088

Nordlin, Eric F.
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

Novi, Thomas J.
ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

O'Day, James
THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

Oppe, S.
THE USE OF MULTIPLICATIVE MODELS FOR ANALYSIS OF ROAD SAFETY DATA
HS-026 967

Owens, Robert D.
THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM
HS-027 031

Pain, Richard F.
EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

HUMAN FACTORS CONSIDERATIONS IN ARROWBOARD DESIGN AND OPERATION
HS-027 129

Parker, R. A.
CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

Parker, Robert H.
A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)
HS-027 097

Parks, Douglas M.
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

Perry, Randy L.
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Peters, Uwe Werner
DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

Petrykanyn, J.
STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

Philpot, John W.
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Pignataro, Louis J.
TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE
HS-027 019

Ploetz, G.
ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT
HS-027 118

Poe, Adam
TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

Ponsford, J. M.
LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

Poyner, Weston R.
HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK
HS-027 116

Pratt, Charles O.
ENERGY CONSERVATION--TECHNIQUES AND RESULTS
HS-027 030

Prensky, Simon
USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

Rabito, Thomas G.
AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

Radelat, Guido
ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

Ragland, Carl
VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION
HS-026 971

Raithel, Wilhelm
ENERGY CONSERVATION IN URBAN TRANSPORTATION
HS-027 021

Rao, Harish S.
ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

Rappaport, Carl S.
TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS
HS-027 022

Rendall, James A.
DRINK, DRIVE AND DIE! THEN ASK US TO DEFINE "ACCIDENT"
HS-027 079

Reynolds, Howard I.
ENERGY CONSERVATION--TECHNIQUES AND RESULTS
HS-027 030

Richards, Stephen H.
FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

Richardson, David
EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

Roach, William T.
TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

Robbins, Cecily
AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

Robinson, J. E.
ENGINE DESIGN EXPERIENCES AND DEVELOPMENT OF CRITICAL COMPONENTS
HS-027 054

Robles, Frederick H., Jr.
COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

Rolf, R. L.
MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

Ross, Paul
ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

Salzburg, Philip M.
SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT
HS-804 782

Schmitz, P. R.
PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

Schmitz, William R.
AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

Scott, W. G.
A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

Seaver, W. B.
AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

Setright, L. J. K.
STEERING GEOMETRY: BACK TO BASICS (MOTORCYCLES)
HS-027 057

Sexton, Thomas R.
ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

Shapiro, Philip S.
CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

Sharp, M. L.
MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

Sharp, Michael C.
EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

Shinha, Kumares C.
ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS
HS-027 025

Shull, H. Eugene
EFFECT OF VEHICLE SIZE AND ENGINE DISPLACEMENT ON AUTOMOBILE FUEL CONSUMPTION
HS-027 074

Simanaitis, Dennis
TAKING THE MESSAGE TO WASHINGTON: R AND T (ROAD AND TRACK) GIVES A CONGRESSIONAL BRIEFING ON AIRBAGS AND OUR READER SURVEY
HS-027 004

Simone, Gerry A.
INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

Simpkins, David L.
REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

Singer-Bart, Susan , ed.
WORK ZONE TRAFFIC CONTROL
HS-027 128

Smith, Michael E.
DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

Smith, Russell A.
THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

Soccoli, F.
STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

Sostkowski, Ronald H.
FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT
HS-803 805

Staats, Elmer B.
EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

Stickler, John J.
SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT
HS-027 117

Stoker, J. Robert
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

Stoughton, Roger L.
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

Strother, C.
SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

Stuart, Alexander
THE ROUGH ROAD TO MAKING OIL AND GAS FROM COAL
HS-027 035

Stucker, James P.
THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS
HS-027 066

Stutts, Jane C.
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

Tabaczynski, R. J.
DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

Taylor, M. A. P.
EVALUATING THE PERFORMANCE OF A SIMULATION MODEL (TRAFFIC ANALYSIS)
HS-027 073

Tennant, J. A.
ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

Thompson, R. Patton
EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

Tischer, Mary Lynn
AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

Tom, Jonathan
AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

Trent, Kevin C.
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Trilling, D.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Turnage, Howard
PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

Uhl, Kim
PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

Van Voorhies, K. L.
ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

Voas, R. B.
AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

Voas, R.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Wagner, Donald R.
SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 007

Wallis, Stan B.
COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

Watts, P. A.
DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

Weaver, Graeme D.
PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

Whitehead, Michael L.
A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

Whorf, Robert P.
AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

Williams, G. Jack
GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

Winokur, J.
STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT
HS-027 099

Womack, J.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

Woods, Donal L.
PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

Wrigley, Al
MATERIALS IN THE '80 MODELS
HS-027 037

Wu, Hai
AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

Wyrick, Dewey A.
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Yee, Geary Y.
INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

Young, Dennis R.
ENERGY IMPACTS ON PASSENGER TRANSPORTATION
HS-027 026

Young, Jonathan
FIELD TESTING A TRUCK ESCAPE RAMP
HS-027 078

Young, R. E.
SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

Ziegler, P.
MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

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Corporate Author Index

A. B. Chance Co., Cranes Pitman Div.
HOW TO BUY AN AERIAL DEVICE FOR A UTILITY TRUCK
HS-027 116

Alabama Power Co.
MECHANIZED UTILITY TRUCKS--A COMPLETE PACKAGE
HS-026 977

Alan M. Voorhees and Associates, Inc., McLean, Va.
TRAVELERS' ATTITUDES AND ENERGY CONSERVATION
HS-027 018

Alan M. Voorhees and Associates, Inc., McLean, Va.
DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

Aluminum Co. of America, Alcoa Technical Center
MINIMIZING THE WEIGHT OF ALUMINUM BODY PANELS
HS-027 090

American Society of Civil Engineers, 345 East 47th St., New York, N.Y. 10017
TRANSPORTATION AND ENERGY. URBAN TRANSPORTATION DIVISION SPECIALTY CONFERENCE PROCEEDINGS, WASHINGTON, D.C., MAY 22-24, 1978
HS-027 011

Argonne National Lab., Chemical Engineering Div.
THERMAL MANAGEMENT OF THE LITHIUM/METAL SULFIDE (BATTERY) ELECTRIC VEHICLE
HS-027 089

Atlantic Res. Corp., 5390 Cherokee Ave., Alexandria, Va. 22314
PASSENGER MOTOR VEHICLE ELECTRICAL SYSTEM INTEGRITY. FINAL REPORT
HS-803 995

Automobile Club of Southern California
MOTORISTS' UNDERSTANDING OF TRAFFIC CONTROL DEVICES
HS-026 964

Barton-Aschman Associates, Inc.
THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM
HS-027 031

Bendix Electronics and Engine Control Systems Group
A FUEL CONTROL SYSTEM FOR 0.4 NOX (OXIDES OF NITROGEN)
HS-027 097

BioTechnology, Inc., Falls Church, Va.
EXPERIMENTAL EVALUATION OF MARKINGS FOR BARRICADES AND CHANNELIZING DEVICES
HS-027 130

HUMAN FACTORS CONSIDERATIONS IN ARROWBOARD DESIGN AND OPERATION
HS-027 129

VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
VISIBILITY REQUIREMENTS OF WORK ZONE TRAFFIC CONTROL DEVICES. FINAL REPORT
HS-027 048

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 2. FINAL REPORT, PHASES 3 AND 4
HS-027 103

BioTechnology, Inc., 3027 Rosemary Lane, Falls, Church, Va. 22042
PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY. FINAL REPORT, PHASES 3AND 4
HS-027 135

PEDESTRIAN ACCIDENTS OCCURRING ON FREEWAYS: AN INVESTIGATION OF CAUSATIVE FACTORS, ACCIDENT DATA COLLECTION AND ANALYSIS. VOL. 3. APPENDIXES. FINAL REPORT
HS-027 136

Budd Co., Plastic Res. and Devel. Center, Troy, Mich.
ADHESIVES FOR THE BONDING OF GRAPHITE GLASS COMPOSITES
HS-026 963

California Dept. of Motor Vehicles
ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

California Dept. of Motor Vehicles, Res. and Devel. Section, P.O. Box 1828, Sacramento, Calif. 95809
CALIFORNIA DEPARTMENT OF MOTOR VEHICLES RESEARCH STUDIES. A SUMMARY OF FINDINGS AND ACTIVITIES
HS-026 998

California Dept. of Transportation, Business and Transportation Agency, P.O. Box 2304, Terminal Annex, Los Angeles, Calif. 90051
EVALUATION OF WARNING AND INFORMATION SYSTEMS. PART 2. COMMERCIAL RADIO ADVISORIES. FINAL REPORT
HS-027 053

California Dept. of Transportation, Div. of Construction
EFFECT OF LONGITUDINAL EDGE OF PAVED SURFACE DROP-OFFS ON VEHICLE STABILITY
HS-027 133

Cambridge Systematics, Inc., Berkeley, Calif.
TRANSPORT INSITITUTIONS AND ENERGY CONSERVATION
HS-027 029

Charles River Associates
USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

Charles River Associates, Cambridge, Mass. 02138
AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

Chloride Technical Ltd., United Kingdom
A HIGH ENERGY TUBULAR BATTERY FOR A 1800 KG PAYLOAD ELECTRIC DELIVERY VAN
HS-027 091

Chrysler Corp., Technical Information Dept.
GLOSSARY OF AUTOMOTIVE TERMINOLOGY. SPANISH-ENGLISH, ENGLISH-SPANISH (GLOSARIO DE LA TERMINOLOGIA AUTOMOTRIZ. ESPANOL-INGLES, INGLES-ESPANOL)
HS-026 115

Colorado Dept. of Highways
TRANSPORTATION ENERGY CONSERVATION IN COLORADO
HS-027 016

Congressional Budget Office
ENERGY EFFICIENCY: WHICH MODES, WHICH PROGRAMS?
HS-027 014

Department of Energy
ENERGY TRANSPORTATION STUDIES AND RELATED ISSUES
HS-027 015
TRANSPORTATION CONSERVATION: CAN WE DELIVER?
HS-027 013
VARIATIONS IN AUTOMOTIVE ENGINE PERFORMANCE AND EMISSIONS WITH CHANGES IN AIR/FUEL RATIO WHEN OPERATING ON ALCOHOL FUELS
HS-027 065

Department of Energy, Div. of Transportation Energy Conservation, Washington, D.C. 20545
COMPARATIVE AUTOMOTIVE ENGINE OPERATION WHEN FUELED WITH ETHANOL AND METHANOL
HS-027 062

Department of Energy, Transportation Energy Conservation Div.
SOME DESIGN CONSIDERATIONS OF AUTOMOTIVE GAS TURBINES
HS-026 975

Department of Transportation, Office of the Assistant Secretary for Policy and International Affairs
TRANSPORTATION ENERGY CONSERVATION: INSTITUTIONAL CONSIDERATIONS
HS-027 022

Dunlap and Associates, Inc., One Parkland Drive, Darien, Conn. 06820
FIRST RESPONDERS EMERGENCY MEDICAL CARE TRAINING CIM (CRASH INJURY MANAGEMENT) COURSE REVISION. FINAL REPORT
HS-805 047

Environmental Protection Agency, Emission Control Technology Div.
EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY DIESEL VEHICLE OVER VARIOUS DRIVING CYCLES. GMC ASTRO 95, 8V-71 NA. TECHNICAL REPORT
HS-027 050

Environmental Protection Agency, Office of Policy Analysis
TRANSPORTATION PLANNING FOR AIR QUALITY IMPROVEMENT
HS-027 017

Environmental Protection Agency, Technology Assessment and Evaluation Branch, 2565 Plymouth Rd., Ann Arbor, Mich. 48105
EXHAUST EMISSIONS AND FUEL ECONOMY FROM AUTOMOBILES USING ALCOHOL/GASOLINE BLENDS UNDER HIGH-ALTITUDE CONDITIONS. TECHNICAL REPORT
HS-027 051

Environmental Protection Agency, Technology Assessment and Evaluation Branch
EVALUATION OF A PROPOSED COLORADO STATE INSPECTION/MAINTENANCE PROGRAM. TECHNICAL REPORT
HS-027 052

Environmental Protection Agency, Washington, D.C. 20460
EPA (ENVIRONMENTAL PROTECTION AGENCY) NOISE CONTROL PROGRAM--PROGRESS TO DATE
HS-027 104

ELTRA Electric Vehicle Group/C and D-Prestolite, Plymouth Meeting, Pa.
ELECTRIC VEHICLE BATTERY DEVELOPMENT
HS-026 979

Federal Hwy. Administration, Office of Res.
ENERGY AND EMISSIONS: THE SIMULATION APPROACH
HS-027 023

Federal Hwy. Administration, Offices of Res. and Devel., Washington, D.C. 20590
TRAFFIC STRIPE REMOVAL
HS-027 137

Federal Hwy. Administration, Oregon Div.
FIELD TESTING A TRUCK ESCAPE RAMP
HS-027 078

Federal Hwy. Administration, Traffic Systems Div., Washington, D.C. 20590
HIGHWAY ADVISORY RADIO OPERATIONAL SITE SURVEY AND BROADCAST EQUIPMENT GUIDE. FINAL REPORT
HS-027 119

Federal Hwy. Administration, Washington, D.C.
DETERMINATION OF FUEL CONSUMPTION AND EMISSIONS
HS-027 024

Federal Hwy. Administration, Washington, D.C. 20590
AN EMPIRICAL ANALYSIS OF BEHAVIORAL INTENTIONS OF SINGLE-OCCUPANT AUTO DRIVERS TO SHIFT TO HIGH OCCUPANCY VEHICLES
HS-027 072

Federal Railroad Administration
DESIGN OF SMALL-SAMPLE HOME-INTERVIEW TRAVEL SURVEYS
HS-027 086

Ford Motor Co.
COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

COMPARISON OF MODEL CALCULATIONS AND EXPERIMENTAL MEASUREMENTS OF THE BULK CYLINDER FLOW PROCESSES IN A MOTORED PROCO (PROGRAMMED COMBUSTION) ENGINE
HS-026 965

HEATING AND AIR CONDITIONING A HEAVY TRUCK
HS-026 974

Ford Motor Co., Allen Park, Mich.
SOFTWARE DESIGN VERIFICATION IN REAL TIME FOR MICROPROCESSOR BASED ELECTRONIC ENGINE CONTROL
HS-027 124

Ford Motor Co., Engineering and Res. Staff
DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

Ford Motor Co., Engineering and Res. Staff, Dearborn, Mich.
AN ATTENUATION AND TRANSPORT DELAY MODEL FOR SINGLE POINT CLOSED-LOOP FUEL METERING SYSTEMS
HS-027 098

Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERES. VOL. 1: AN EXECUTIVE SUMMARY. FINAL REPORT
HS-804 914

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 2: A COMPREHENSIVE SUMMARY OF LIKELY ACTIONS BY DOMESTIC COMPANIES UNDER FUEL-ECONOMY REGULATIONS: 1978-1985. FINAL REPORT
HS-804 915

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 3: AN HISTORICAL PERSPECTIVE ON THE AUTOMOTIVE INDUSTRY. FINAL REPORT
HS-804 916

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS. VOL. 4: ADAPTATION OF A COMPUTER SIMULATION MODEL OF THE INDUSTRY. FINAL REPORT
HS-804 917

General Accounting Office, Washington, D.C. 20548
EXCESSIVE TRUCK WEIGHT: AN EXPENSIVE BURDEN WE CAN NO LONGER SUPPORT. REPORT TO THE CONGRESS BY THE COMPTROLLER GENERAL OF THE UNITED STATES
HS-027 127

General Analysis, Inc., San Diego, Calif.
ANALYZING THE FEASIBILITY OF THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC OFFENSES. VOL. 1: TECHNICAL SUMMARY. FINAL REPORT
HS-803 973

General Motors Corp. Plastics Process Devel. Dept.
INNOVATIVE SHEET MOLDING COMPOUND PROCESSES
HS-027 096

General Motors Corp., Detroit Diesel Allison Div.
FIELD EXPERIENCE WITH THE DETROIT DIESEL ALLISON 404/505 INDUSTRIAL GAS TURBINE ENGINES
HS-026 976

General Motors Corp., Engineering Staff
ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING
HS-027 126

General Motors Mfg. Devel., Warren, Mich.
REINFORCED REACTION INJECTION MOLDING PROCESS AND MATERIALS FOR AUTOMOTIVE BODY PANELS
HS-027 092

Georgia Dept. of Transportation, Planning Data Services Section, Atlanta, Ga.
GEORGIA'S EVALUATION OF FEDERAL HIGHWAY ADMINISTRATION PROCEDURES FOR ESTIMATING URBAN VEHICLE MILES OF TRAVEL
HS-027 083

Gilbert R. Green and Co., Inc., Natick Office Park, Natick, Mass. 01760
AUTOMOTIVE MARKETING METHODS AND PRACTICE. FINAL REPORT
HS-804 522

Globe-Union, Inc.
240 VDC (VOLT DIRECT-CURRENT) ELECTRIC VEHICLE SYSTEM
HS-026 980

Goodyear Tire and Rubber Co., Adhesive Div., Ashland, Ohio
AUTOMATED STRUCTURAL BONDING SYSTEMS FOR GRAPHITE AND OTHER HIGH-STRENGTH COMPOSITES
HS-027 123

Goodyear Tire and Rubber Co., Logan, Ohio
CONTROLLING THE PHYSICAL PROPERTIES OF RIM (REACTION INJECTION MOLDING) URETHANES WITH NON-ORGANIC REINFORCEMENT
HS-027 093

H H Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730
SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES. FINAL REPORT
HS-805 033

H. H. Aerospace Co., Inc., Civil Air Terminal, Bedford, Mass. 01736
AUTOMOTIVE MANUFACTURERS' COST/REVENUE, FINANCIAL AND RISK ANALYSIS: PROJECTED

IMPACT OF AUTOMOBILE MANUFACTURING ON THE PLASTICS INDUSTRY. FINAL REPORT
HS-803 657

HH Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730

AUTOMOTIVE MANUFACTURER RISK ANALYSIS: MEETING THE AUTOMOTIVE FUEL ECONOMY STANDARD. FINAL REPORT
HS-803 763

International Assoc. of Chiefs of Police, Bureau of Operations and Res., 11 Firstfield Rd., Gaithersburg, Md. 20760

FOUR REGIONAL WORKSHOPS ON THE NATIONAL MAXIMUM SPEED LIMIT (NMSL) AND HIGHWAY SAFETY PROGRAMS. FINAL REPORT
HS-803 805

Interstate Commerce Commission, Washington, D.C.

TRANSPORT EFFICIENCIES AND VEHICLE OCCUPANCY RATES
HS-027 032

INNOVATRIX, Inc., Ingomar, Pa.

TRAINING PROGRAM FOR OPERATION OF EMERGENCY VEHICLES. PURSUIT DRIVING FOR LAW ENFORCEMENT OFFICERS. ADVANCED UNIT
HS-900 036

Kansas State Univ.

COMFORT CRITERIA FOR AIR CONDITIONED AUTOMOTIVE VEHICLES
HS-026 973

Kilkeary, Scott and Associates, Inc., 509 Powell Dr., Annapolis, Md. 21401

A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT
HS-027 008

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT
HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT
HS-027 101

Lucas Batteries Ltd., England

LIFE TESTING OF LEAD ACID BATTERIES FOR ELECTRIC VEHICLE DUTIES
HS-026 978

Management Engineers, Inc., Reston, Va.

THE NATIONAL ACCIDENT SAMPLING SYSTEM MEETING HELD OCTOBER 16-17, 1978
HS-804 888

Massachusetts Inst. of Tech. Sloan Automotive Lab

DEVELOPMENT AND USE OF A CYCLE SIMULATION TO PREDICT SI (SPARK IGNITION) ENGINE EFFICIENCY AND NOX (NITRIC OXIDE) EMISSIONS
HS-026 972

Metropolitan Washington Council of Governments

CAR POOLING SURVEY AND PROGRAM EVALUATION, WASHINGTON, D.C.
HS-027 028

Metropolitan Washington Council of Governments, Office of Technical Services

TRAVEL DATA FROM THE U.S. CENSUS: A NEW FOUNDATION FOR TRANSPORTATION PLANNING
HS-027 084

WORKPLACE INTERVIEWS AS AN EFFICIENT SOURCE OF TRAVEL SURVEY DATA
HS-027 085

Michigan State Univ., Center for Environmental Quality, East Lansing, Mich.

COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

Midwest Res. Inst., Kansas City, Mo.

EFFECTS OF TAPER LENGTH ON TRAFFIC OPERATIONS IN CONSTRUCTION ZONES
HS-027 132

Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION. VOL. 1: EXECUTIVE SUMMARY. FINAL REPORT
HS-805 052

Motor Vehicle Manufacturers Assoc. of the United States, Inc., Statistics Dept., 300 New Center Bldg., Detroit, Mich. 48202

MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) MOTOR VEHICLE FACTS AND FIGURES '79
HS-027 070

National Hwy. Safety Advisory Com., State-Federal Relations Task Force

STATE-FEDERAL RELATIONS IN HIGHWAY SAFETY. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 313

National Hwy. Traffic Safety Administration

MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, APRIL 1, 1979 TO JUNE 30, 1979
HS-804 884

VEHICLE AGGRESSIVITY MEASUREMENT AND EVALUATION
HS-026 971

National Hwy. Traffic Safety Administration, Engineering Test Facility, P.O. Box 37, East Liberty, Ohio 43319

SCHOOL BUS PASSENGER SEAT AND LAP BELT SLED TESTS. FINAL REPORT
HS-804 985

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590

FACT BOOK. STATISTICAL INFORMATION ON HIGHWAY SAFETY
HS-804 030

THE NATIONAL ACCIDENT SAMPLING SYSTEM; A STATUS REPORT. VOL. 4: IMPLEMENTATION SCHEDULE AND RESOURCE REQUIREMENTS
HS-804 852

NATIONAL ACCIDENT SAMPLING SYSTEM. PILOT STUDY. FINAL REPORT
HS-804 909

National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590

"STAR OF LIFE" EMERGENCY MEDICAL CARE SYMBOL. BACKGROUND, SPECIFICATIONS, AND CRITERIA
HS-803 721

MANDATORY SAFETY BELT USAGE LAWS. TASK FORCE REPORT. REV.
HS-804 088

National Hwy. Traffic Safety Administration, Office of Prog. Evaluation, 400 7th St., S.W., Washington, D.C. 20590

AN EVALUATION OF STANDARD 214 (SIDE DOOR STRENGTH OF PASSENGER CARS)
HS-804 858

National Hwy. Traffic Safety Administration, Office of Public Affairs and Consumer Services, Washington, D.C. 20590

HOW TO DEAL WITH MOTOR VEHICLE EMERGENCIES. REVISED ED.
HS-803 966

National Hwy. Traffic Safety Administration, Washington, D.C. 20590

MOTOR VEHICLE SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT OF 1966 AND THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT OF 1972, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 371

HIGHWAY SAFETY 1978. A REPORT ON ACTIVITIES UNDER THE HIGHWAY SAFETY ACT OF 1966 AS AMENDED, JANUARY 1, 1978--DECEMBER 31, 1978
HS-803 372

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT. VOL. 3
HS-803 896

SUMMARY OF NATIONAL ALCOHOL SAFETY ACTION PROJECTS
HS-804 032

PRELIMINARY ANALYSIS OF THE NATIONAL CRASH SEVERITY STUDY: FACTORS IN FATAL ACCIDENTS
HS-804 773

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR STATE TRAFFIC RECORDS. FISCAL YEARS 1980-1984
HS-805 116

PROPOSED PROGRAM IMPLEMENTATION PLAN FOR MOTOR VEHICLE REGISTRATION, TITLING, AND ANTITHEFT. FISCAL YEARS 1980-1984
HS-805 117

CONSUMER RESOURCE GUIDE (FOR AUTOMOBILE INFORMATION AND AVENUES FOR COMPLAINT)
HS-805 269

REMARKS BEFORE THE WESTERN CONFERENCE CONVENTION OF THE INTERNATIONAL BROTHERHOOD OF TEAMSTERS, SEATTLE, WASHINGTON, AUGUST 27, 1979 (TRUCKING SAFETY)
HS-810 355

REMARKS BEFORE THE 1979 AUTOMOTIVE NEWS WORLD CONGRESS, DETROIT, MICHIGAN, JULY 25, 1979 (FUEL ECONOMY)
HS-810 356

REMARKS BEFORE THE ALLIANCE OF AMERICA INSURERS, BOSTON, MASSACHUSETTS, MAY 21, 1979
HS-810 357

STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY REGULATION, SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, CONCERNING S. 1337, A BILL TO PROVIDE GREATER COMPLIANCE WITH THE NATIONAL MAXIMUM SPEED LIMIT, SEPTEMBER 17, 1979
HS-810 359

REFRESHER TRAINING PROGRAM FOR THE BASIC EMERGENCY MEDICAL TECHNICIAN. COURSE GUIDE.
HS-900 032

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590

AN ANALYSIS OF THE IMPACT OF DRIVER EDUCATION ON THE LICENSING OF 16 AND 17 YEAR OLDS
HS-804 850

National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. (VOL. 1.) FINAL REPORT
HS-803 883

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT: VOL. 2: SYSTEM PLAN. FINAL REPORT
HS-803 884

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 3: STATE GUIDE. FINAL REPORT
HS-803 885

INTEGRATED SAFE DRIVING INFORMATION SYSTEM DEVELOPMENT. VOL. 4: CATALOG OF AVAILABLE MATERIALS. FINAL REPORT
HS-803 886

ASSESSMENT OF VEHICLE SAFETY PROBLEMS FOR SPECIAL DRIVING POPULATIONS. FINAL REPORT
HS-804 918

National Safety Council, Statistics Dept., 444 N. Michigan Ave., Chicago, Ill. 60611

FACTORS CONTRIBUTING TO THE DECREASE IN MOTOR-VEHICLE FATALITIES FROM 1973 TO 1977
HS-027 114

North Dakota State Hwy. Dept., Transportation Services Div., Capitol Grounds, Bismarck, N. Dak. 58505

1978 NORTH DAKOTA VEHICULAR ACCIDENT FACTS
HS-026 962

Northeast Ohio Areawide Coordinating Agency, Transit Planning Group, Cleveland, Ohio

TRANSPORTATION ENERGY CONSERVATION PLAN

HS-027 027

Ohio Dept. of Education, Driver Education Section, 65 South Front St., Room 811, Columbus, Ohio 43215

THE MOPED REPORT

HS-027 010

Oregon Dept. of Transportation, State Hwy. Div., Transportation Bldg., Salem, Oreg. 97310

SPEED ADVISORY INFORMATION FOR REDUCED VISIBILITY CONDITIONS. EXECUTIVE SUMMARY. FINAL REPORT

HS-027 007

Peat, Marwick, Mitchell and Co., Washington, D.C.

FIELD DATA COLLECTION AND SAMPLING PROCEDURES FOR MEASURING REGIONAL VEHICLE CLASSIFICATION AND OCCUPANCY

HS-027 081

Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. EXECUTIVE SUMMARY. FINAL REPORT

HS-027 120

PAVEMENT CONDITION MEASUREMENT NEEDS AND METHODS. FINAL REPORT

HS-027 121

Planning Environment International, McLean, Va.

SYNTHESIS (OF THE CONFERENCE ON TRANSPORTATION AND PLANNING)

HS-027 012

Polytechnic Inst. of New York, Transportation Training and Res. Center

TRANSPORTATION ENERGY CONSERVATION IN NEW YORK STATE

HS-027 019

Purdue Univ.

ENERGY CONSERVATION AND TRAFFIC CONTROL AT LOW VOLUME INTERSECTIONS

HS-027 025

Rand Corp., 1700 Main St., Santa Monica, Calif. 90406

THE EFFECTS OF FUEL ECONOMY MANDATES AND TAXES ON DRIVERS: IMPACTS BY INCOME GROUPS

HS-027 066

Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142

SIMULATION OF AN URBAN BATTERY BUS VEHICLE. FINAL REPORT

HS-027 117

ANALYSIS OF LIFE-CYCLE COSTS AND MARKET APPLICATIONS OF FLYWHEEL ENERGY-STORAGE TRANSIT VEHICLES. FINAL REPORT

HS-027 118

Road Safety and Traffic Authority, 801 Glenferrie Rd., Hawthorn, Vic. 3122, Australia

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. TECHNICAL REPORT

HS-027 059

Road Safety and Traffic Authority, 801 Glenferrie Rd., Hawthorn, Vic. 3122, Australia

THE EFFECT OF THE ABSOLUTE SPEED LIMIT OF 100 KM/H ON ACCIDENTS IN VICTORIA. SUMMARY REPORT

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A PEDESTRIAN PLANNING PROCEDURES MANUAL: VOL 1, OVERVIEW. FINAL REPORT

HS-027 008

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 2, PROCEDURES. FINAL REPORT

HS-027 100

A PEDESTRIAN PLANNING PROCEDURES MANUAL. VOL. 3, TECHNICAL SUPPLEMENT. FINAL REPORT

HS-027 101

Seattle Engineering Dept.

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA

HS-027 082

Seattle-King County Commuter Pool

TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA

HS-027 082

Sperry Rand Corp., Sperry Systems Management, Great Neck, N.Y. 11020

STUDY OF THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. VOL. 2, EQUIPMENT SURVEY. FINAL REPORT

HS-027 099

State of Washington, Dept. of Licensing, Olympia, Wash. 98504

SPECIAL ADJUDICATION FOR ENFORCEMENT (SAFE) SEATTLE. FINAL REPORT SUPPLEMENT

HS-804 782

State Univ. of New York, Stony Brook, N.Y.

ENERGY IMPACTS ON PASSENGER TRANSPORTATION

HS-027 026

Stockton (Calif.) Police Dept.

INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)

HS-804 838

Systems Control Inc.

ENGINE CONTROL OPTIMIZATION VIA NONLINEAR PROGRAMMING

HS-027 126

Teledyne Geotech, 3401 Shiloh Rd., Garland, Tex. 75041

ADVANCED CRASH RECORDER DEVELOPMENT. IMPLEMENTATION PLAN

HS-805 088

MODEL 44400 AUTOMOTIVE CRASH RECORDER.
HS-805 089

Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
EVALUATION OF MOTORCYCLE SAFETY HELMET USAGE LAW. FINAL REPORT
HS-027 077

FIELD EVALUATION OF TRAFFIC MANAGEMENT STRATEGIES FOR MAINTENANCE OPERATIONS IN FREEWAY MIDDLE LANES
HS-027 134

Texas Transportation Inst., Texas A and M Univ., College Station, Tex.
URBAN TRANSPORTATION PLANNING FOR GOODS AND SERVICES: A REFERENCE GUIDE
HS-027 006

Texas Transportation Inst., Texas A and M Univ., College Station, Tex. 77843
PASSING AND NO-PASSING ZONES: SIGNS, MARKINGS, AND WARRANTS. FINAL REPORT
HS-027 102

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
APPLICATIONS AND USE OF TRANSPORTATION DATA
HS-027 080

WORK ZONE TRAFFIC CONTROL
HS-027 128

Transportation Systems Center, Cambridge, Mass.
USE OF TRAVEL DIARIES IN COLLECTION OF TRAVEL DATA ON THE ELDERLY AND THE HANDICAPPED. ABRIDGMENT
HS-027 087

TRANSPO Group, Bellevue, Wash.
TECHNIQUES FOR MONITORING AUTOMOBILE OCCUPANCY: RESEARCH IN THE SEATTLE AREA
HS-027 082

TRW, Globe Motors Div., Dayton, Ohio
DESIGN OF A LINEAR STEP ACTUATOR (AUTOMOTIVE APPLICATION)
HS-027 122

United States Steel Corp., Res. Lab., Monroeville, Pa.
HIGH-STRENGTH STEEL SHEETS FOR AUTOMOBILE BODY PANELS
HS-027 094

United Systems Testing, Inc., 372 Fee Fee Rd., Maryland Heights, Mo. 63043
THE DESIGN, IMPLEMENTATION, AND OPERATION OF A MOBILE DIAGNOSTIC INSPECTION SYSTEM IN THE METROPOLITAN ST. LOUIS AREA. FINAL REPORT
HS-805 104

United Technologies, Essex Group
THE DISADVANTAGE FUNCTION TECHNIQUE FOR OPTIMIZATION OF ENGINE CONTROL STRATEGIES
HS-027 125

University of the Pacific, Stockton, Calif.
INCREASED D.U.I. (DRIVING UNDER THE INFLUENCE) ENFORCEMENT PROGRAM, STOCKTON, CALIFORNIA. ANNUAL REPORT (3RD)
HS-804 838

University of California, Inst. of Transportation Studies, Berkeley, Calif.
LIGHT VEHICLE TECHNOLOGY SUBSITUTION
HS-027 020

University of Kansas, Lawrence, Kans.
A TECHNIQUE FOR THE ASSESSMENT OF THE FUEL-CONSERVATION POTENTIAL OF A GROUND TRANSPORTATION SYSTEM
HS-027 034

University of Miami, Dept. of Mechanical Engineering, P.O. Box 248294, Coral Gables, Fla. 33124
EFFECTS OF BLENDING ETHANOL WITH GASOLINE ON AUTOMOTIVE ENGINES, STEADY STATE PERFORMANCE AND REGULATED EMISSIONS CHARACTERISTICS
HS-027 064

University of Michigan Hwy. Safety Res. Inst., Ann Arbor, Mich.
THE FARS DATA AND SIDE-IMPACT COLLISIONS (FATAL ACCIDENT REPORTING SYSTEM)
HS-027 009

University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
AN ANALYSIS OF MOPEDS AS A POTENTIAL SAFETY PROBLEM IN THE UNITED STATES. VOL. 1: REVIEW OF THE LITERATURE AND DATA SEARCH. FINAL REPORT
HS-805 035

University of Santa Clara, Engineering and Applied Science Res., Santa Clara, Calif. 95053
ETHANOL IN MULTICYLINDER AUTOMOTIVE SI (SPARK IGNITION) ENGINES; A STUDY OF PERFORMANCE AND EMISSION CHARACTERISTICS RELATIVE TO INDOLENE AND METHANOL
HS-027 063

University of Tennessee, Transportation Center, Knoxville, Tenn. 37916
1978 ANNUAL REPORT. TENNESSEE CHILD PASSENGER SAFETY PROGRAM. FINAL REPORT
HS-805 017

Urban Mass Transportation Administration
ENERGY CONSERVATION IN URBAN TRANSPORTATION
HS-027 021

Verve Res. Corp., Unibank Bldg., 51 Monroe St., Rockville, Md. 20850
AN EXAMINATION OF THE COMFORT AND CONVENIENCE OF 1979 SAFETY BELT SYSTEMS. FINAL REPORT
HS-803 887

Volkswagenwerk AG, Wolfsburg, Germany
REINFORCED POLYESTER IN THE EUROPEAN AUTOMOTIVE INDUSTRY
HS-027 095

VARTA Batteries Ltd., Canada
DEVELOPMENT STATUS AND EXPERIENCE OF VARTA'S BATTERY SYSTEMS GAINED ON ELECTRIC VEHICLES TESTED IN WEST GERMANY UNDER ACTUAL OPERATING CONDITIONS
HS-027 049

Wagner-Mcgee Associates, Alexanderia, Va.
VISIBILITY REQUIREMENTS FOR TRAFFIC-CONTROL DEVICES IN WORK ZONES. ABRIDGMENT
HS-027 131

Wayne State Univ., Dept. of Civil Engineering, Detroit, Mich. 48202
A COMPARATIVE ANALYSIS OF TRUCK ACCIDENTS IN THE STATE OF MICHIGAN
HS-026 999

Western Michigan Univ., Inst. of Public Affairs, Kalamazoo, Mich.
COPING WITH ENERGY LIMITATIONS IN TRANSPORTATION: PROPOSALS FOR MICHIGAN. A PUBLIC POLICY DISCUSSION PAPER WITH RECOMMENDATIONS FOR STATE ACTION
HS-027 058

Wilbur Smith and Associates, New Heaven, Conn.
ENERGY CONSERVATION--TECHNIQUES AND RESULTS
HS-027 030

3M Co.
THE EFFECTS OF AN EMPLOYEE TRANSPORTATION PROGRAM
HS-027 031

Contract Number Index

ANL-31-109-38-3628
ELTRA Electric Vehicle Group/C and D-Prestolite, Plymouth Meeting, Pa.
HS-026 979

ANL-31-109-38-4206
ELTRA Electric Vehicle Group/C and D-Prestolite, Plymouth Meeting, Pa.
HS-026 979

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HS-027 048

C-3-18
California Dept. of Transportation, Business and Transportation Agency, P.O. Box 2304, Terminal Annex, Los Angeles, Calif. 90051
HS-027 053

DOT-FH-11-7950
Oregon Dept. of Transportation, State Hwy. Div., Transportation Bldg., Salem, Oreg. 97310
HS-027 007

DOT-FH-11-8816
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HS-027 008

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HS-027 101

DOT-FH-11-9161
Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120
HS-027 120

Pennsylvania Dept. of Transportation, Bureau of Materials, Testing and Res., 1118 State St., Harrisburg, Pa. 17120
HS-027 121

DOT-FH-11-9164
Texas Transportation Inst., Texas A and M Univ., College Station, Tex. 77843
HS-027 102

DOT-FH-11-9189
Sperry Rand Corp., Sperry Systems Management, Great Neck, N.Y. 11020
HS-027 099

DOT-HS-343-3-682
State of Washington, Dept. of Licensing, Olympia, Wash. 98504
HS-804 782

DOT-HS-355-3-718
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
HS-027 103

BioTechnology, Inc., 3027 Rosemary Lane, Falls, Church, Va. 22042
HS-027 135

BioTechnology, Inc., 3027 Rosemary Lane, Falls, Church, Va. 22042
HS-027 136

DOT-HS-5-01194
Stockton (Calif.) Police Dept.; University of the Pacific, Stockton, Calif.
HS-804 838

DOT-HS-6-01345
International Assoc. of Chiefs of Police, Bureau of Operations and Res., 11 Firstfield Rd., Gaithersburg, Md. 20760
HS-803 805

DOT-HS-6-01397
National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
HS-803 883

National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
HS-803 884

National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
HS-803 885

National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
HS-803 886

DOT-HS-6-01412
Minicars, Inc., 55 Depot Rd., Goleta, Calif. 93017
HS-805 052

DOT-HS-6-01439
National Public Services Res. Inst., 123 North Pitt St., Alexandria, Va. 22314
HS-804 918

DOT-HS-7-01641
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HS-805 088

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HS-805 089

DOT-HS-7-01691
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HS-805 033

DOT-HS-7-01730
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Dunlap and Associates, Inc., One Parkland Drive, Darien, Conn. 06820
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HS-804 914

Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
HS-804 915

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HS-804 916

Futures Group, 76 Eastern Blvd., Glastonbury, Conn. 06033
HS-804 917

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HS-805 035

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HS-803 887

DOT-TSC-1034
Massachusetts Inst. of Tech. Sloan Automotive Lab; Ford Motor Co., Engineering and Res. Staff
HS-026 972

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Gilbert R. Green and Co., Inc., Natick Office Park, Natick, Mass. 01760
HS-804 522

DOT-TSC-1333
H. H. Aerospace Co., Inc., Civil Air Terminal, Bedford, Mass. 01736
HS-803 657

HH Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730
HS-803 763

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HS-027 063

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University of Miami, Dept. of Mechanical Engineering, P.O. Box 248294, Coral Gables, Fla. 33124
HS-027 064

IAC-78-08-36-A-1-AA
Texas A and M Univ., Texas Transportation Inst., College Station, Tex.
HS-027 077

MVMA-WSU-7904-C1.56
Wayne State Univ., Dept. of Civil Engineering, Detroit, Mich. 48202
HS-026 999

NHTSA-P.O.-7-3161
General Analysis, Inc., San Diego, Calif.; California Dept. of Motor Vehicles
HS-803 973

NHTSA-P.O.-9-6219
INNOVATRIX, Inc., Ingomar, Pa.
HS-900 036

NHTSA-9-6131
United Systems Testing, Inc., 372 Fee Fee Rd., Maryland Heights, Mo. 63043
HS-805 104

TS-R-611
State Univ. of New York, Stony Brook, N.Y.
HS-027 026

Report Number Index

AR-12	HS-803 371 HS-803 372
AR-3	HS-804 838
CED-79-94	HS-027 127
DOT-TSC-NHTSA-79-21	HS-803 657
DOT-TSC-NHTSA-79-24	HS-803 763
DOT-TSC-NHTSA-79-31	HS-804 522
DOT-TSC-UMTA-78-77	HS-027 118
DOT-TSC-UMTA-79-15	HS-027 117
ED-78-10	HS-805 047
Freeway-Operation-Branch-75-6	HS-027 053
FHWA-CA-07-78-01	HS-027 053
FHWA-RD-78-116	HS-027 099
FHWA-RD-78-143	HS-027 048
FHWA-RD-78-169	HS-027 135
FHWA-RD-78-170	HS-027 103
FHWA-RD-78-171	HS-027 136
FHWA-RD-78-80	HS-027 007
FHWA-RD-79-T0293	HS-027 053
FHWA-RD-79-45	HS-027 008
FHWA-RD-79-46	HS-027 100
FHWA-RD-79-47	HS-027 101
FHWA-RD-79-5	HS-027 102
FHWA-RD-79-67	HS-027 120
FHWA-RD-79-68	HS-027 121
FHWA-RD-79-87	HS-027 119
FHWA-TS-79-227	HS-027 137
GF-3704-1052	HS-027 099
HCP/W1737-01	HS-027 062
HDV-78-10	HS-027 050
PB-290 611	HS-027 052
PB-290 612	HS-027 051
PB-291 611	HS-027 053
PB-292 323	HS-803 805
PB-293 766	HS-027 050
PB-294 781	HS-027 048
PB-295 396	HS-803 887
RAND/P-6127	HS-027 066
RD-678-2	HS-804 985
RF-3453-1	HS-027 102
RP-76-18	HS-027 120 HS-027 121
RSS-DMV-4C	HS-026 998
SAE-SP-436	HS-026 115
SAE-790121	HS-027 122
SAE-790122	HS-026 973
SAE-790124	HS-026 974
SAE-790128	HS-026 975
SAE-790129	HS-026 976
SAE-790149	HS-026 963

SAE-790150	HS-027 123
SAE-790155	HS-027 116
SAE-790156	HS-026 977
SAE-790157	HS-026 978
SAE-790158	HS-026 979
SAE-790159	HS-026 980
SAE-790160	HS-027 049
SAE-790161	HS-027 089
SAE-790162	HS-027 091
SAE-790164	HS-027 090
SAE-790165	HS-027 092
SAE-790166	HS-027 093
SAE-790168	HS-027 094
SAE-790169	HS-027 095
SAE-790170	HS-027 096
SAE-790172	HS-027 098
SAE-790174	HS-027 124
SAE-790175	HS-027 097
SAE-790176	HS-027 125
SAE-790177	HS-027 126
SAE-790290	HS-026 965
SAE-790291	HS-026 972
SAE-790297	HS-026 971
SAE-790736	HS-027 009
TAEB-79-1	HS-027 051
TAEB-79-2	HS-027 052
TC-79-006	HS-805 017
TR-79-5	HS-805 088
TR-79-6	HS-805 089
TRR-701	HS-027 080
TRR-703	HS-027 128
UC-96	HS-027 062
UM-HSRI-79-13	HS-027 058
UMTA-MA-06-0093-79-1	HS-027 117
UTMA-MA-06-0044-78-2	HS-027 118
VS-62	HS-803 887
07-391-623130	HS-027 053

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NTIS: National Technical Information Service, Springfield, Va. 22161. **Order by title and accession number: PB, AD, or HS.** When no PB number is given for NHTSA Technical Reports, order by prefacing the HS number with DOT, i.e. DOT-HS-000 000.

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and catalog or stock number.**

Reference copy only: Documents may be examined at the NHTSA Technical Reference Division or borrowed on inter-library loan through your local library.

See publication: Articles in journals, papers in proceedings, or chapters in books are found in the publication cited. These publications may be in libraries or purchased from publishers or dealers.

SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Corporate author: Inquiries should be addressed to the organization listed in the individual citation.

ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-027 138

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)

Activities and accomplishments of the Urban Mass Transportation Administration Service and Methods Demonstration (SMD) Prog. during fiscal year 1978 are summarized, with emphasis on the relevant findings of the innovative service and methods concepts being tested, the gaps that still exist in understanding their effectiveness, and the direction of future efforts to fill these gaps. Project activities are organized into four major program areas: conventional transit service innovations (priority techniques for high occupancy vehicles, traffic restrictions, transit service improvements, and vehicle innovations), pricing and service innovations (fare payment strategies, fare-free transit, road and parking pricing, pricing and service variations), paratransit (demand-responsive transit, transportation brokerage, ridesharing, and subscription bus), and service for special user groups (elderly and handicapped persons, persons with limited income). Services for special user groups include specialized demand-responsive transportation, user-side subsidies, social service agency transportation, and accessible fixed-route bus services. Support activities in the areas of evaluation methodology and information dissemination are also described. The SMD Prog. focuses on strategies which require relatively low levels of capital investment and which can be implemented in a short time frame.

by Bruce D. Spear; Robert Casey; Don Kendall; Marian Ott; Elizabeth Page
Transportation Systems Center, Cambridge, Mass. 02142
Rept. No. UMTA-MA-06-0049-79-7 ; 1979 ; 45p
Rept. for Oct 1977-Sep 1978.
Availability: NTIS

HS-027 139

ALCOHOL AND TRAFFIC SAFETY: A SELECT ANNOTATED BIBLIOGRAPHY

Bibliographic information and abstracts are provided for 89 journal articles and conference papers on the subject of alcohol and traffic safety. Topics covered include rehabilitation and education programs; social, demographic, and psychological characteristics of persons cited for driving while intoxicated; experimental studies; traffic accident records; accident fatalities (including motorcyclists and pedestrians); recidivism; enforcement and adjudication; public information campaigns; traffic safety education; legal drinking age; young drivers; alcohol and other drugs; the role of the physician; licensing controls; and determination of blood alcohol concentration.

State Univ. of New York at Albany, Inst. for Traffic Safety Management and Res., 1400 Washington Ave., Albany, N.Y. 12222
Rept. No. TSSB-02-0779 ; 1979 ; 20p
At head of title: ITSMR Traffic Safety Subject Bibliography.
Availability: Corporate author

HS-027 140

THE IMPORTANCE OF LANE-CHANGING ON MOTORWAYS

Measurements were taken on the Bundesautobahn A5 between Bruchsal and Karlsruhe in Germany to investigate vehicle lane changing, passing, and overtaking. As traffic volume increased, it was found that the lane-changing frequency strongly increased at first, and then increased less than proportionately until it attained a maximum value of 600 lane changes/hr.km at a traffic volume of 2000 vehicles/hr. At higher traffic volumes, lane-changing frequency was reduced. With growing traffic volume, the demand for lane changing increases; but the opportunities to pass decrease. The maximum value of, on average, 3500 passings/hr.km was found to occur at a traffic volume of 2400 vehicles/hr. Higher traffic volumes resulted in reduced passing frequency, the result of the reduced speed difference between off- and near-side lanes. For a traffic volume of 2000 vehicles/hr, it was calculated that 10 vehicles are overtaken per overtaking (vs. passing) process. According to the observations, it can be expected that 10 to 15 obstructing lane changings/hr can be expected at traffic volumes exceeding 2000 vehicles/hr.km. Results of the study indicate that the possibility for lane changing on multi-lane highways relates to the overtaking possibility on two-way roads. When evaluating the accident rate corresponding to traffic volume, the conflicts arising from lane changings and their frequency should be taken into account. The introduction of a variable-message sign indicating NO LANE CHANGING should be considered, especially on the grounds of improved traffic safety.

by Udo Sparmann
Publ: Traffic Engineering and Control v20 n6 p320-3 (Jun 1979) 1979 ; 6refs
Sponsored by Federal Ministry of Traffic and Transport (West Germany).
Availability: See publication

HS-027 141

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER

An "Electronic Gas Watchdog" is being used experimentally in the West Midlands (England) County Council Traffic Control Areas, to warn of the presence of gas in traffic signal controllers. In the control areas (Wolverhampton and Conventry), part of the routine inspection of signals includes use of standard commercial "sniffers" to make two checks a year in low-risk areas and monthly checks in high-risk areas. Even with monthly inspection, detecting a gas leak before it reaches explosion concentration is a matter of luck. The recently available Electronic Gas Sensor is capable of detecting natural gas at a concentration well below that required for an explosion. In urban traffic control areas, electronic monitoring is particularly suitable, as the reply from the outstation transmission unit (OTU) to the control center normally has at least one bit not used for conventional reply data. The transmission of a gas alarm therefore requires only the connection of a suitable Gas Watchdog to the OTU, together with modifications to the control center software. Results of the first six weeks of the pilot experiment have been satisfactory. Since the long-term stability of the sensor unit is not known, it is being carefully monitored.

by P. Welsh; K. Fox
Publ: Traffic Engineering and Control v20 n6 p315 (Jun 1979)
1979
Availability: See publication

HS-027 142

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)

Engineering changes in 1980 model year cars to meet Federal emission and fuel economy standards are described individually for American Motors, Chrysler, Ford, and General Motors (Buick, Cadillac, Chevrolet, Oldsmobile, and Pontiac divisions). The technology used to meet the changes in emission standards to .41 g/mi hydrocarbons from 1.5 g/mi, 7 g/mi carbon monoxide from 15 g/mi, and 2 g/mi nitrogen oxides (unchanged), and stricter standards for California includes varying types of catalytic converters, air injection systems, feedback carburetors, and fuel injection. The first of four approaches used to achieve the 20 mpg corporate average fuel economy standard was improving driveline efficiency, notably through the use of lockup torque converters and new wide gear ratio transmissions (some with overdrive) and lower (numerically) rear axle ratios. Finer engine calibration has been made possible by electronic controls, feedback carburetors, and fuel injection systems. In order to reduce power requirements, aerodynamics continue to be refined to lessen drag, and rolling resistance has been decreased through the use of P-metric radial tires that can carry as much as 35 psi. Tread compounds are also being studied for additional reductions in rolling resistance. For reducing performance levels, engines are downsized with power to go from zero to 60 mph in 15 sec. Car weight was reduced by some use of alternate materials and by downsizing.

by Ken Zino
Publ: Motor v152 n3 p32, 34-8, 40, 42, 45-6, 48, 50 (Sep 1979)
1979 ; 1ref
Availability: See publication

HS-027 143

WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)

Most experts on the aftermarket believe that the downsizing of American automobiles will have little effect on profits of service shops. The theory is that opposing forces at work will have the net effect that smaller cars will neither increase nor decrease profits. While the new cars are more durable and will require less frequent replacement of parts, parts on small cars wear out faster than parts on big, heavy cars because they have to work harder to cover a given distance. Three other factors unrelated to car downsizing that will increase service business include: continuing growth of the car population, continuing increase in the number of miles driven by car owners each year, and increase in the length of time people are keeping their cars. The automakers have continuing programs to reduce parts numbers and to make more parts interchangeable between cars in the same family. General Motors is making more pieces standard between different car lines; the same rule applies to service tools. Independent shops and car dealers buy parts from many sources, and the number of parts manufactured and marketed by non-Detroit firms is increasing. The burden will not be on the installer of the parts, but on the wholesaler, who will have to maintain the stocks to service the cars. Another important factor is that the real profit for the auto mechanic is in labor, not in parts.

by Bob Lund
Publ: Motor v152 n3 p52-4, 56 (Sep 1979)
1979
Availability: See publication

HS-027 144

THE TROUBLE WITH AUTO WARRANTIES

All new cars made by General Motors, Ford, and Chrysler come with a basic, no-charge 12-mo/12,000-mi "limited" warranty. American Motors offers a "full" warranty called the "Buyer Protection Plan" which compensates consumers for the expenses of alternative transportation during repair work. The AMC plan avoids a major provision in the Magnuson-Moss Warranty Act, i.e. the "lemon provision" which offers a refund or replacement to the buyer for a product that is not repaired properly after a "reasonable" number of tries. The House Consumer Protection Subcom. has been holding hearings on a bill that would require automakers to offer a full warranty ("full" refers to consumers rights), if they give any warranty at all. Manufacturer's written warranties, TV commercials, brochures, and oral promises are all forms of "express" warranties which can be used to back up a consumer claim. An entirely different type of warranty, created by state laws under the Uniform Commericial Code, is called an "implied" warranty (the product has to be usable for the purposes for which it is intended). About 25 states have some provision for implied warranty protection beyond the express warranty period. In the last year, automakers have been promoting the "extended service contract". At a cost ranging from $75 to $365, these contracts protect against certain major repair expenses for 2 yr/24,000 mi to 5 yr/50,000 mi. Independent companies also offer this type of contract. It is important not to pay for coverage of repairs already included under the original, implied, or "secret" warranty. For the extended service contracts, the odds appear heavily weighted against the buyer. The so-called "secret" warranty covers defects that are widespread for a certain car model, but which appear after the 12,000-mi warranty expires. In separate sections, Canada's rust protection warranties are compared with those of the U.S., and extended service contracts are compared in a tabulation.

Publ: Consumer Reports v44 n10 p598-601 (Oct 1979)
1979
Availability: See publication

HS-027 145

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS

In view of decreasing fuel octane ratings at the pump, some practical and effective ways of obtaining higher octanes for performance engines are explored. One approach is to dilute a good racing gasoline with straight pump fuel (only for use with engines which run on leaded fuel). With a 2:1 premium gasoline/racing gasoline mix, octane rating will go up 2.6 points. Top grade racing gasoline, with its high lead content, is limited to the race track. For engines which run only on unleaded fuel, a solution is a mixture of gasoline and alcohol ("gasohol"). A blend of gasoline with 10% methanol, for example, can raise the octane by 3 1/4 points. Based on methanol costing 75 cents/gal more than gasoline, this mixture will cost 2.5 cents/octane number/gal over the basic fuel cost (one-fifth the price of increasing the octane by using racing gasoline). Problems with methanol relate to the air-fuel ratio (rejetting may be required), fuel phase separation with water contamination, fuel system corrosion, and vapor lock at high temperatures. Ethanol offers similar results without as many problems, but costs 5 cents/octane/gal. One of the easiest ways for hot rodders to boost octane is to use commercial additives (mostly aniline); they can be used with all types of gasoline. At most, the cost per octane/gal of an additive is between 8.5 to 14 cents. A different approach is the use of water injection or carburetion system, offering the advantage of suppressing detonation only when it is about to happen. A water injection unit may cost $80 to $90, and requires careful calibration to meet specific engine needs, and addition of alcohol to prevent freezing.

by David Vizard
Publ: Car Craft p38-40, 80-2 (Oct 1979)
1979
Availability: See publication

HS-027 146

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN

This set of guidelines enables the user to determine the need for a reduced visibility guidance (RVG) system (for aiding motorists in such conditions as fog, dust, or blowing snow), to compare the needs of different locations on a quantitative basis, to configure candidate systems tailored to meet the requirements of the problem, and to compare the utility and costs of the candidate systems. The entire process is based on the results of an extensive survey and evaluation of the effectiveness of reduced visibility guidance systems. The evaluation was designed to determine which instruments, installation techniques, and operational measures were effective in dealing with reduced visibility, and the conditions in which they were effective. The survey was intended to obtain information, if possible, from every operational system in the continental U.S., and to discover the reasons why some systems have become nonoperational. The guidelines contain useful information on configuring systems, locating sensing and signing equipment, selecting among communications techniques and, if necessary, data processing techniques. Wherever equipment choices are to be made, each equipment type is described and its advantages and disadvantages are discussed, and a recommendation is made for reduced visibility applications.

by John Petrykanyn; William Heiss; Joseph Winokur
Sperry Systems Management, Great Neck, N.Y. 11020
DOT-FH-9189
Rept. No. FHWA-Implementation-Package-79-2 ; 1979 ; 147p 13refs
See HS-027 099 and HS-027 149 for the two-volume report on which these guidelines are based (FHWA-RD-78-115, FHWA-RD-78-116).
Availability: GPO

HS-027 147

THE BIG SHORTFALL IN AUTO FUEL ECONOMY

The Dept. of Energy (DOE) now estimates that by 1985 the cumulative shortfall between the Environmental Protection Agency (EPA) fuel economy ratings and the number of mpg actually obtained on the road may be the equivalent of 1 million barrels of oil/day or more. The fleet average rating of 27.5 mpg which automakers are required by law to achieve by 1985 may be less than 22 mpg in real-world terms. DOE, General Motors, and Ford Motor Co. studies of 1978 models indicated that the potential fuel economy has been overstated by 20% to 28%. EPA and Dept. of Transportation (DOT) officials say that the addition of only 22 engineers and analysts would double the size of the fuel economy program staff, allowing more confirmatory testing by EPA of prototype vehicles and the staffing of a strong analytical effort that might alleviate the shortfall problem. Half or more of the shortfall occurs because of the way the Energy Policy and Conservation Act was written. Certain fixed assumptions of unrealistic driving conditions and habits were locked into the program. According to EPA, the rest of the shortfall, estimated by DOE at one-third to one-half of the total, is the result of differences in fuel economy achieved by "hand-built" prototypes and production cars, and differences in vehicle performance on a dynamometer and on the road. Manufacturers are found to take advantage of loopholes in the fuel economy test procedures. In the review of fiscal 1981 budget requests, the Office of Management and Budget foresees questions concerning the adequacy of the EPA and DOT commitment to the fuel economy program.

by Luther J. Carter
Publ: Science v205 p1232-4, 1236 (21 Sep 1979)
1979
Availability: See publication

HS-027 148

CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY

Data were obtained and analyzed for all bicycle-related, motor vehicle accidents which occurred in Kentucky between 1 Jul 1975 and 30 Jun 1976. Also analyzed were data on all injury-producing bicycle accidents recorded by the Kentucky Electronic Surveillance System in 1976. The 10- to 14-year-old age group had the largest number of bicycle-related, motor vehicle accidents, and the highest accident frequency. Males were involved in four times as many accidents as females. Accident severity tended to decrease as age increased. The highest proportion of accidents occurred between 3:00 PM and 7:00 PM. Most accidents occurred in urban areas, on residential streets. The most common type of accident was the right-angle accident and the most common accident involved a cyclist failing to stop or yield at a controlled intersection. For bicyclists 5 years of age or younger, most accidents resulted from the cyclist exiting from a driveway into the motorist's path. For those 20 years of age or older, the most common accident type involved a motorist colliding with the rear of a bicycle. Although the majority of accidents (71%) were the result of an error by the cyclist, the percentage of cyclists at fault decreased with increasing age. Bicycle-related, motor vehicle accidents represented under 10% of all injury-producing bicycle accidents.

by Kenneth R. Agent; Charles V. Zegeer
Kentucky Dept. of Transportation, Div. of Res., 533 South Limestone St., Lexington, Ky. 40508
KYP-76-80
Rept. No. RR-498; HPR-PL-1(14)-Part-3-B ; 1978 ; 56p 19refs
Based on study, "Safety and Design Innovations for Bicycle Travel."
Availability: Corporate author

HS-027 149

THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT

Effectiveness is evaluated in a detailed description of reduced visibility guidance (RVG) systems for aiding motorists in conditions such as fog, dust, or blowing snow, along with operating strategies. The evaluation is intended to determine which factors of system design contribute to system effectiveness and which approach is economically feasible for a specific highway condition. Literature, equipment, and operation system surveys were conducted. Data were assembled and analyzed from facilities which have RVG systems (located in Arizona, California, New Jersey, Oregon, Pennsylvania, Virginia and Wyoming). A utility/cost model was generated which permits quantitative comparisons between systems and "measure of need" index was devised to compare the seriousness of the hazard among different locations. The study resulted in a methodology which quantifies a reduced visibility problem and allocates resources systematically in proportion to the need. Appended are a literature review (including abstracts of primary references and keyword index); typical data requirements for system evaluation; special features evaluation studies; evaluation rationale for assigning utility model compliances in economic evaluation; sample system evaluation dockets; a discussion of the relationship between problem area characteristics and system elements; and estimated costs for nine model systems.

by John Petrykanyn; William Heiss; Joseph Winokur; F. Soccoli
Sperry Systems Management, Great Neck, N.Y. 11020
DOT-FH-11-9189
Rept. No. FHWA-RD-78-115; SSM-GF-3704-1055 ; 1979 ; 291p refs
Vol. 2 (FHWA-RD-78-116), Equipment Survey, is HS-027 099.
A companion document, "User Guidelines for Reduced Visibility System Design" (FHWA Implementation Package 79-2), is HS-027 146.
Availability: NTIS

HS-027 150

EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT

An experiment was conducted at the Federal Hwy. Administration's Maine Facility to examine the relative effectiveness of roadside signs and vehicle markings for warning motorists of the presence of a slow-moving vehicle on a rural, two-lane road. A staged slow-moving vehicle was introduced into the traffic stream, and data were recorded on the reactions of overtaking motorists. Samples of motorists were exposed to different combinations of roadside signs, vehicle markings, and types of slow-moving vehicles. The use of standard four-way flashers was found to be an effective device for decreasing the potential of a dangerous conflict when a faster moving vehicle is overtaking a slower vehicle on an upgrade. Specific positive effects were relative to the initial reaction distance, closing rate, and minimum following headway. While the effects of the roadside signs were positive in the vicinity of the sign placement (out of sight of the slow vehicle), there were no lasting effects relative to the actual overtaking maneuver.

by M. H. Lanman, 3rd.; H. S. Lum; R. W. Lyles
Federal Hwy. Administration, Washington, D.C. 20590;
University of Maine-Orono, Orono, Maine 04473
DOT-FH-11-9245
Rept. No. FHWA-RD-79-79 ; 1979 ; 52p 12refs
Research planning, experimentation, and data processing assistance provided by Maine Dept. of Transportation.
Availability: NTIS

HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT

by William F. McFarland; Lindsay I. Griffin; John B. Rollins; William R. Stockton; Don T. Phillips; Conrad L. Dudek
Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
DOT-FH-11-9243
Rept. No. FHWA-RD-79-52 ; 1979 ; 21p
For abstract, see HS-027 152 (FHWA-RD-79-53).
Availability: NTIS

HS-027 152

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT

Improved cost-effectiveness techniques are developed for evaluating highway safety programs. These improved techniques include better methods of determining accident costs; statistical procedures for calculating accident costs; a consistent system for evaluating accident cost and countermeasure effectiveness; and improved incremental cost-benefit algorithm for ranking safety projects. A review of selected accident countermeasure studies and a critique of current procedures for evaluating safety programs are presented. Three techniques are recommended for use in allocating safety funds: incremental cost-benefit with improved algorithm; dynamic programming; and integer programming. Federal, state, and local highway safety activities are examined.

by William F. McFarland; Lindsay I. Griffin; John B. Rollins; William R. Stockton; Don T. Phillips; Conrad L. Dudek
Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
DOT-FH-11-9243
Rept. No. FHWA-RD-79-53 ; 1979 ; 353p 199refs
For summary report, see HS-027 151 (FHWA-RD-79-52).
Availability: NTIS

HS-027 153

DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS

An automated engine dynamometer test procedure was developed and mathematical models for primary engine control variables derived from the resulting data base. Main engine variables were characterizations of fuel and emission flow rates as a function of air-fuel ratio, spark timing, percentage of exhaust gas recirculation, and any other required engine parameter for different engine speed and load operating conditions. The mathematical procedure involved sequential testing at many speed-load conditions for various combinations of air fuel ratio, spark timing and exhaust gas recirculation. Total testing time required to generate the data base of more than 2,000 test points was less than 12 hours. An independent transient speed-load test to validate engine models was conducted. Measured and model-predicted data were compared for this test which corresponded to one segment of the Environmental Protection Agency urban schedule. The inclusion of temperature as an independent variable in the emission modeling effort improved model quality, indicating that temperature is a factor in bridging the gap between steady-state and transient engine data. Information on regression analysis and modeling results is appended.

by J. A. Tennant; R. A. Giacomazzi; J. D. Powell; H. S. Rao
General Motors Corp., Engineering Staff; Stanford Univ.; Systems Control, Inc.
Rept. No. SAE-790178 ; 1979 ; 14p 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 154

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES

Spark ignition engine control parameters (spark advance, air-to-fuel ratio, and exhaust gas recirculation) are analyzed in terms of optimum fuel economy, constrained emission levels, and tradeoffs. Emphasis is placed on procedures and techniques adopted for the off-line approach using steady-state mapping dynamometer data of conventional production engines. Analysis tools include vehicle simulation programs, Federal Test Procedure urban and highway drive cycle schedules, multiple regression techniques, and dynamic programming procedures. Applications of engine control parameter optimizations are illustrated, with reference to engine data bases (four-cylinder and eight-cylinder engines). Results are presented on fuel economy as a function of various regulated emissions and engine settings, and on increases or decreases in fuel economy relative to emission constraints, emission control strategy, and vehicle drive cycles. Hydrocarbon, carbon monoxide, and nitrogen oxide emission data are provided.

by Thomas Trella
Research and Special Programs Administration, Cambridge, Mass.
Rept. No. SAE-790179 ; 1979 ; 23p 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 155

MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS

Three typical powder metal-forged steels made from Hoganas powders have been studied with regard to their machining behavior using a special machinability test developed in 1960 by Volvo AB in Sweden. The test rates steels against a standardized free-machining steel, allowing recommendations for cutting data for turning, milling, drilling, tapping, and reaming of powder metal-forged materials to be empirically established. It is concluded that the powder metal-forged materials machine notably better than a common tough-hardening steel; two materials are as good as a common constructional steel and one material is better. Measured cutting and machine parameters for powder metal-forged materials are more consistent than those for comparable wrought steels.

by R. Coos; G. Bockstiegel; C. Muhren
Hoganas AB, PM-Process Devel., Sweden; Volvo-Flygmotor AB, Technical Devel., Sweden
Rept. No. SAE-790192 ; 1979 ; 12p 2refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 156

THE DELCO REMY 5MT CRANKING MOTOR

The Innovative Delco Remy 5MT Cranking Motor is traced from project initiation in 1972 to its present production (begun in late 1976). The 5MT is a radical departure from its predecessor as the heart of the new 5MT motor is a powdered metal inner frame having the poles integral with the flux carrying frame. The manufacture of the powdered metal inner frame marks Delco-Remy's first powder metal fabricating venture. Only very minor problems were experienced in the start-up phase and based on limited production experience, no serious scrap problems have been observed. Tool wear has not been a problem, as the development data predicted (tool life estimated at 500,000 - 1,000,000 parts) and density does not seem to be a major factor in tool life. The success of the inner frame program has prompted expansion. The current projected potential of powder usage is 50,000,000 lb/yr in the next five years.

by Charles R. Ashton
General Motors Corp., Delco Remy Div., Anderson, Ind.
Rept. No. SAE-790195 ; 1979 ; 8p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 157

BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)

A new blade fuse developed for low voltage (32 volts or less) automotive applications is discussed in terms of state-of-the-art advancement, under the following major topics: basic facts relative to fusing; review of existing performance standards for fuses in automotive electrical circuits; comparison of cartridge and blade fuse performance; reasons for the blade fuse's higher performance levels; and advantages in using the blade fuse in automotive circuits. The blade fuse was designed to fulfill the needs of the automotive industry for improved performance and reliability in a more space-efficient size. Achievement of this objective was the direct result of a design with fewer discrete components, reducing the chance for variability, coupled with a highly automated manufacturing process which maintains a high degree of production uniformity. The new fuse provides safer, less expensive, more trouble-free circuit protection.

by Kenneth R. Audino
Littelfuse, Inc.
Rept. No. SAE-790199 ; 1979 ; 11p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 158

SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT

by J. B. Humphreys; P. C. Box; T. L. Sullivan; D. J. Wheeler
University of Tennessee, Dept. of Civil Engineering, Knoxville, Tenn. 37916
DOT-FH-11-8879
Rept. No. FHWA-RD-79-75 ; 1978 ; 18p
For abstract, see HS-027 159.
Availability: NTIS

HS-027 159

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT

Relationships were examined among parking configurations (angle, parallel, or no parking), parking density, traffic flow, street width, pedestrian activity, and highway safety. A literature review identified 27 studies of accidents related to curb parking. (Abstracts of selected papers are appended.) Angle parking was identified in many studies as significantly more hazardous than parallel parking. Parking configuration variables associated with accident rates include functional classification of streets, utilization of parking spaces, and abutting land use. Data on over 4800 accidents associated with parking on over 170 miles of streets in 10 U.S. cities were collected and analyzed. Intersection and midblock accident comparisons were made for selected cities, and midblock accident rates were computed for the previously mentioned variables. No relationship was found between accident rate and street width or parking angle, but the rate was found to vary with land use (a surrogate variable for parking turnover) and parking utilization. Parking prohibition was estimated to reduce midblock accident rates from 19% to 75%, which is equivalent to total on-street accident rate reductions (including intersections) of 8% to 30%. Results of field studies suggest that speeds of, and delays to through vehicles are related to parking configuration. Speeds of through vehicles averaged 3.7 mph less when adjacent to angle parking, compared with parallel parking. Few pedestrian conflicts with curb parking were found. Backing sight distance restrictions caused by special vehicles (e.g. campers) had no effect on unparking times from angle parking lots. Sight distance for the backing driver was less for a 45 degree angle than for angles of 22 1/2 degrees or 30 degrees. The combined width needed for an adjacent lane plus parking lane was determined to be 22 ft for parallel, 26 ft for a 22 1/2 degree angle, 30 ft for a 45 degree angle, and 31 ft for angles of 60 degrees and over.

by J. B. Humphreys; P. C. Box; T. D. Sullivan; D. J. Wheeler
University of Tennessee, Dept. of Civil Engineering, Knoxville, Tenn. 37916
DOT-FH-11-8879
Rept. No. FHWA-RD-79-76 ; 1978 ; 205p 72refs
For summary report, see HS-027 158.
Availability: NTIS

HS-027 160

NATIONAL TRANSPORTATION STATISTICS. ANNUAL REPORT

Selected U.S. transportation statistics covering the period 1966 through 1976-1977 are provided in tabular and graphical form, as compiled from a wide variety of government and private sources. Included are cost, inventory, and performance data describing the passenger and cargo operations of the following modes: air carrier, general aviation, automobile, bus, truck, local transit, rail, water, oil pipeline, and gas pipeline. Basic descriptors of U.S. transportation are included, such as operating revenues and expenses, number of vehicles and employees, and vehicle and passenger miles. Formats used to spotlight aspects of the major transportation modes are tree displays, modal profiles, performance indicators, and transportation trends. Two supplemental data sections detail the role of transportation in the economy and the relation of energy to transportation. The first section provides time series transportation statistics for the period 1967-1977. The second section, covering the same period and extending back to 1950, is divided into four parts: energy consumption, energy transport, energy intensiveness, and energy supply and demand. Included are the operating costs of automobiles of different sizes. Appended are a bibliography, data sources for figures, tables, and profiles, and a glossary divided according to transportation modes.

Transportation Systems Center, Statistical Information Reporting Branch, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-RSPA-79-19 ; 1979 ; 209p refs
Rept. for 1977.
Availability: GPO, stock no. 050-000-00154-7

HS-027 161

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)

Dunlop's racing program is one method of intensive development of new motorcycle tire designs, enabling new technology to be passed on to the ordinary road user in a relatively short time. Dunlop's involvement in motorcycle racing competition began with the production of the first practical pneumatic (vs. solid) cycle tire. One of its first major contributions to road tire development was the "trigonic" profile (a tire cross section resembling a triangle with rounded corners) which allowed more of the sidewall to be utilized as tread area. As the power and performance of motorcycles increased, the trigonic profile became more rounded to accommodate straight-line high speed. Dunlop produced the first bias-belted tire, initially for racing and subsequently for the K91 road tire. In a bias-belted tire, the conventional cross-ply construction is supplemented by a textile (Kevlar aramid fiber) "breaker" placed under the tread. In order to provide a direct input to road tire development, technicians record every detail of performance at the race track; tire temperature provides important performance information. A prime requirement of design is a tire's ability to run continuously at motorcycle top speed; this ability is governed mainly by the speed at which a standing wave is generated behind the contact patch. The speed at which tread ripple sets in can be affected by numerous design factors associated with tradeoffs in other parameters, such as stability, handling, durability. It is hoped that the present emphasis on tread compounds will provide the average road user with the same benefits provided by recent work on profiles and tread patterns.

by Jack Leonard
Publ: Engineering v219 n9 p1147-9 (Sep 1979)
1979
Availability: See publication

HS-027 162

'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)

The Federal Trade Commission has ruled that automakers, starting with the 1979 model year, can advertise only city driving fuel economy figures appearing on the window sticker. "Highway" mpg figures can be used only for reporting Corporate Average Fuel Economy (CAFE) to Congress. Running contrary to the new labeling rule are CAFE standards that increase to 19 mpg in the 1979 models vs. 18 mpg in 1978. Passenger car emission standards are unchanged for 1979, but new standards for light-, medium-, and heavy-duty trucks become effective for the first time. Light trucks up to 8500 lbs gross vehicle weight (GVW) must meet 1.7 g/mi (grams per mile) hydrocarbons, 18 g/mi carbon monoxide, and 2.3 g/mi nitrogen oxides. Trucks over 8500 lb have three options based on g/bhp (grams-per-brake horsepower). Light trucks must also meet a maximum of 6 g/test evaporative shed emission standard. Although fuel economy of trucks will be measured and each vehicle labeled, trucks over 6000 lb will not be included in CAFE figures. For the 1979 models, automakers must certify that each vehicle is free of uncontrolled emissions that could be dangerous to public health. Automakers face a new laboratory procedure regarding dynamometer loading during new-vehicle emission certification. The first phase of new bumper damageability standards, replacing Federal Motor Vehicle Safety Standard (FMVSS) 215, Exterior Protection, is being introduced for 1979. FMVSS 212, Windshield Retention, coverage is being extended to all 1979 light-duty trucks up to 10,000 lb. A revised FMVSS 116, covering brake fluids, establishes a new color code and labeling requirements based on fluid grade.

by Paul T. Haluza
Publ: Ward's Auto World v14 n9 p31 (Sep 1978)
1978
At head of title: Washington Wrapup.
Availability: See publication

HS-027 163

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS

The frequencies of injury insurance claims to occupants of 1977 and 1978 model year passenger cars are presented by car size group, body style subgroup, and individual series. The results are derived from the "no-fault" personal injury protection injury experience of these car occupants from model introduction through Dec 1978. The data were supplied by four insurers: Aetna Life and Casualty, Allstate, Nationwide, and State Farm. Of the five high-volume (at least 1% of total exposure) 1978 models with the best and the five with the worst injury claim frequencies, the Oldsmobile Delta 88 four-door had the best record, the Honda Civic two-door the worst. All five 1978 models with the worst results were subcompacts (four imports by Datsun, Honda, and Toyota, and a domestic Ford product). All five 1978 models with best results were General Motors products (four intermediates, one compact; all four-door models). Three of the five 1978 models with the worst results (Honda Civic, Toyota Corolla, and Datsun B-210) were also among the 1977 high-volume models with the worst results. Four of the five 1978 models with the best claim frequency results (Oldsmobile Delta 88, Chevrolet Caprice, Buick LeSabre, and Chevrolet Impala) were also among the 1977 models with the best results. Cars with smaller wheel bases had much higher claim frequencies than cars with larger wheelbases. In each car size group, youthful operators had far higher claim frequencies than other operators. Regular two-door models had higher claim frequencies than corresponding four-door models. Within the subcompact, compact, and intermediate size groups, sports or specialty models had the highest claim frequencies.

Highway Loss Data Inst., Watergate 600, Washington, D.C. 20037
Rept. No. HLDI-I-78-1 ; 1979 ; 52p refs
Advance copy. See also HS-027 164.
Availability: Corporate author

HS-027 164

SMALL IMPORTS DOMINATE 'WORST CAR' LIST

A news release announces the results of an analysis report by the Highway Loss Data Inst. (HLDI) of insurance injury claim frequencies for both 1977 and 1978 models from the time of their introduction through Dec 1978. For 1978 cars, high-volume models (at least 1% of total exposure) heading the list of "best cars" were: Oldsmobile Delta 88 (55), Chevrolet Caprice (64), Buick LeSabre (65), Chevrolet Impala (75), and Chevrolet Nova (79). Figures in parentheses are index numbers of relative claim frequency/1000 insured vehicle years; 100 represents the average injury claim frequency for all 1978 models. On the list of 1978 cars with the worst injury claim frequencies were: Honda Civic (144), Toyota Corolla (142), Datsun B-210 (140), Ford Mustang II (133), and Toyota Celica (131). Four of the five "best" 1978 models were also among the 1977 models with the best results, the 1978 Nova being the exception. Two of the five "worst" 1978 models (Toyota Corolla, Datsun) were also among the 1977 high-volume models with the worst results. A low-volume listing in the report for 1977 models (less than 1% exposure) indicated that the Datsun 200 SX two-door had the worst claim frequency results, and the Chrysler Newport four-door the best. The HLDI report reinforced earlier findings of higher claim frequencies with young drivers and smaller cars; higher claim frequencies with two- vs. four-door cars; and highest claim frequencies for sports and specialty models (subcompact/compact/intermediate sizes), especially with young drivers.

Insurance Inst., for Hwy. Safety, Watergate 600, Washington, D.C. 20037
1979 ; 3p
See also HS-027 163.
Availability: Corporate author

HS-027 165

AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT

The recognition value of 25 symbols developed by the International Standard Organization for controls and displays in road vehicles was investigated using 125 subjects (75 males, 50 females) with more than one year of driving experience. The study demonstrated the high recognition value of 20 of the 25 symbols which, in general, is not influenced by sex or additional military driving experience. The five symbols which failed the acceptance criterion of a minimum 75% recognition are: LIGHTER, CHOKE, MASTER LIGHTING SWITCH, REAR FOG LIGHT, AND FRONT FOG LIGHT. It is assumed that the symbol for LIGHTER is of less importance and will be recognized after its initial use. Discrimination between FRONT FOG LIGHT and REAR FOG LIGHT can be improved by rotating the latter symbol 180 degrees. One symbol for FOG LIGHTS would be preferable because under fog conditions both lights will be turned on. The symbol for MASTER LIGHTING SWITCH should be redesigned to avoid confusion with INTERIOR LIGHTING. The symbol for CHOKE should be redesigned, perhaps to replace the pictograph with a verbal label.

by Dieter Wiegand; Monica M. Glumm
Army Human Engineering Lab., Aberdeen Proving Ground, Md. 21005
Rept. No. AD-A068 136; TM-1-79; 79-04-30-033 ; 1979 ; 24p 9refs
Availability: NTIS

HS-027 167

HOW TO SURVIVE...WHEN YOUR CAR TURNS INTO A TRAP

Safety advice is provided for the motorist for surviving three types of freak accidents: caught in a burning car, trapped by a falling power line, and imprisoned in a car that has plunged into deep water. Safety experts say that a motorist can survive these emergencies in many cases, although some of the survival techniques themselves carry risks. If a hot wire falls on a car, the advice is to stay inside the car and await help, if possible; to warn other motorists to keep away; to assume all surfaces are electrically charged; and if it is necessary to exit (e.g. because of fire), to jump as far away as possible from car without touching it after feet are on the ground. It is emphasized that any kind of movement near a live wire can be risky. If a car catches fire, it is advised to shut off engine, take a moment to locate the fire (if in the upholstery, open windows fast); to get out fast; if the fire is in the engine, to beware of a hot blast when opening the hood, and to fight fire with extinguishers from opposite sides ("double team") if possible. It is advised not to fight a gas tank fire with an extinguisher. If a car plunges into deep water it is advised to remember that most cars float for a minute or two, usually right side up; to get out via the windows, sunroof, deck, or hatch as soon as possible (do not try to open doors); to remember that a car sinks toward the engine and an air bubble may form at opposite end; if unable to exit car before it starts to sink, to turn on lights if possible. After the car has hit bottom, and water inside car has risen above the doors the occupant may open the door and swim to safety (or if doors are jammed, shatter a window).

by Ed Fales
Publ: Popular Mechanics v152 n4 p106-8, 200 (Oct 1979)
1979
Availability: See publication

HS-027 168

AUTOMOTIVE GAS TURBINES: WHERE DO THEY STAND?

Although the gas turbine has been explored for application to automobiles, trucks, and buses for 30 years, a production gas turbine engine has not yet been realized. Gas turbine problems are becoming increasingly difficult, expecially in the small engine sizes required for automobiles. Among these problems are lower aerodynamic efficiencies resulting from scale effects, larger boundary layers, increased flow blockage, higher thermal gradients due to smaller heat sinks, increased relative blade tip clearance, and minimum blade thicknesses; and lower reliability (than for large gas turbines) due to increased structural, mechanical, and thermal fatigue, and higher thermal stress, resulting from the increased high-frequency excitation of higher rotating speeds. Higher costs are the result of tighter tolerances, thinner blading, smoother surface finishing, more costly materials, larger speed reduction, and variable geometry (nozzles, inlet guide vanes, etc.). The key obstacles to gas turbine engine in automotive applications are essentially the unavailability of low-cost, high-temperature materials such as ceramics, and the aerodynamic inefficiency of small turbomachinery.

Publ: Automotive Engineering v87 n8 p24-9 (Aug 1979)
1979
Based on SAE-790046 "Some Design Considerations of Automotive Gas Turbines," by Robert A. Mercure.
Availability: See publication

HS-027 169

ROTARY ENGINE'S LIGHT-LOAD COMBUSTION IMPROVED

Experimental investigations by Toyota engineers of correlations between ignition and combustion chamber gas composition, together with the processes of internal EGR (exhaust gas recirculation) have resulted in improved light-load combustion in Toyota's Stratified Charge Rotary Engine. The internal EGR in rotary engines sometimes results in excessive misfiring under idling conditions, producing poor driveability and lowered fuel economy. Toyota engineers isolated sources of misfire according to their location in either of two plugs or the combustion chamber itself. By adopting both air injection at the exhaust port and glow ignition, a drastic reduction in fuel consumption at idle was possible, as well as beneficial effect on driveability in the low-speed range. In addition to these improvements at light load, nitrogen oxides (NOx) formation was suppressed in higher load ranges by adjusting the internal EGR via stopping the air injection and supplying a leaner mixture to decrease reaction at the glow plug. With these countermeasures, good data are obtained without using external EGR for the stringent Japanese 10-mode emissions test. Toyota data indicate the engine in carbureted form has demonstrated the ability to meet 1981 U.S. emission standards of 0.41/3.4/1.0 g/mi of hydrocarbons, carbon monoxide, and NOx using only an oxidation converter as aftertreatment.

Publ: Automotive Engineering v87 n8 p33-8 (Aug 1979)
1979
Based on SAE-790435 "Analysis of Light-Load Performance in Rotary Engines," by Toshiyuki Kohno, Ryozo Ito, Minoru Morita, and Nobutaka Mizuno.
Availability: See publication

HS-027 170

BRAKE APPORTIONING VALVE SENSES DECELERATION

Researchers at Girling have designed deceleration-conscious apportioning valves suitable for passenger car and light-truck applications. These inertia-controlled ball reducing valves achieve load-conscious behavior without the need for load linkages. The G-valve is pressure-conscious, the GP-VALVE is pressure-limiting, and a third valve is height-sensing. These apportioning valves help improve vehicle stability during braking. The optimum selection of valve type must be resolved by consideration of functional factors (vehicle characteristics, brake equipment, wheel cylinder size, lining friction variation, valve installation, and legal requirements), as well as economic factors. Adhesion utilization curves have shown that G and GP valves fulfill all legal requirements for all passenger cars including front-wheel drive vehicles with maximum load variations.

Publ: Automotive Engineering v87 n8 p40-3 (Aug 1979)
1979
Based on SAE-790395 "Deceleration Conscious Apportioning Valves for Passenger Cars and Light Trucks," by H. Rath and G. Roggenbuck.
Availability: See publication

HS-027 171

FALL CAR CARE GUIDE, SERVICE TIPS

Service tips are provided for the car owner on lubrication, ignition, fuel system, emissions control, battery, and brake system. The functions of motor oil and filter and intervals between changes are discussed; viscosity number, multigrade vs. single grade oil, and American Petroleum Inst. oil classification system are explained; step-by-step instructions (and some illustrations) are provided for changing oil and filter. Procedures are outlined for inspecting fluid levels in the brake master cylinder, automatic transmission (according to manufacturer), and cooling system. Step-by-step instructions are given for lubricating chassis ball joints. A checklist is provided of other car parts that should be lubricated when the chassis is greased, as well as those that may require lubrication. Step-by-step instructions are given for inspecting various components of the ignition system: ignition coil, distributor cap, high-voltage (secondary circuit) cables, as well as for replacing spark plugs, and setting ignition timing. Fuel system maintenance covers the function, types, and changing of fuel filters. Step-by-step instructions are given for replacing the three types of fuel filters (in-line, internal, and combination). Instructions are given on servicing carburetor air filters and chokes. Emission control information includes servicing the fuel evaporation canister, positive crankcase ventilation system, thermostatic control valve, and exhaust gas recirculation valve (according to manufacturer). Battery maintenance includes safety, inspection, removal, cleaning (battery and cable terminals and battery posts), and quick battery check. Instructions for inspecting brake linings (pads), cylinders and lines are outlined and illustrated. Transmission and tire/wheel servicing are briefly discussed (service intervals and checks for transmissions, and tire/wheel inspection and tire rotation and inflation).

Publ: Popular Mechanics v152 n4 p150, 152-6, 158-60, 162, 164, 166, 168-9, 172 (Oct 1979)
1979
Availability: See publication

HS-027 172

ARGUMENT CLOUDS GASOHOL ISSUE

While gasohol (90% gasoline, 10% ethanol) is a much inferior fuel to gasoline, it is considered the best alternative fuel available today. Gasohol can and probably will make a small, but significant contribution to the U.S. automotive fuel supply in the next decade, although gasohol's role could be expanded or diminished by major changes in the availability and price of gasoline or by new technology in gasohol production. To reduce the daily consumption of gasoline in the U.S. by 10%, or 18.9 million gallons, an almost 100-fold increase in ethanol production would be required. One important advantage of ethanol is its role in the U.S. economy (trade balance). It is also a renewable resource, produceable from many agricultural products. General Motors and other organizations feel that gasohol's main attribute is as an indicator of the seriousness of the oil shortage. The Dept. of Energy says that a net liquid fuel gain can be achieved when oil or natural gas are not used as a power source for alcohol production. Recent government and industry studies have found that late model cars running on gasohol will get 1% to 3% less mileage than those running on gasoline, and that gasohol use reduces carbon monoxide emissions but increases hydrocarbon, aldehyde, and nitrogen oxides emissions. Other gasohol problems relate to driveability, and fuel phase separation. Starting in 1981, however, U.S. cars should be better able to use gasohol because of electronic control of the fuel-air mixture, thereby compensating for alcohol effects on driveability and emissions. Although gasohol costs more than gasoline today, subsidies and special tax advantages are in effect to stimulate its use.

by Joseph M. Callahan
Publ: Automotive Industries v159 n9 p90-2 (Sep 1979)
1979
Availability: See publication

HS-027 173

GOVERNMENT ROADMAPS BASIC AUTO RESEARCH

Highlights are presented of a personal interview with Howard Dugoff, deputy administrator of the National Hwy. Traffic Safety Administration, concerning the cooperative government-industry automotive research program for which he has been appointed to the task of planning and coordinating. The program seeks to adopt a more sophisticated fuel economy technology and to develop a socially responsible automobile. Industry and government will share an annual research bill estimated at $50 to $100 million for projects assigned to university, industry, and Federal laboratories. Mr. Dugoff said that his first priority is to reach an agreement on a framework for the program. Critical issues relate to funding, and the extent and nature of coordination among participants. One general agreement is that there should be a somewhat independent oversight or advisory group. It is anticipated that scientific developments would be applied either voluntarily by the auto industry to meet consumer demand or, in the event of continued regulation, to help the industry comply more efficiently and effectively. The philosophy of the program is that the Federal government will make the initial contribution to advancing basic research, after which the industry, with its technological resources and business acumen, will take over in developing a new product. The ultimate objective of the program is an automobile with good fuel economy, low emissions, and a high level of safety and damageability (low cost to repair).

by Paula D. Hodges
Publ: Automotive Industries v159 n9 p69-73 (Sep 1979)
1979
Availability: See publication

HS-027 174

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY

A packet of learning activities (teacher's manual, student guide) has been designed to fit into existing segments of instruction in U.S. history and civics courses at the middle school level. The first activity, entitled "Getting There," enables the student to hypothetically select his "dream" car and evaluate the mpg he will obtain with its use. It is intended that the student determine whether he can afford this car and that he consider alternate means of transportation (i.e. mass transit systems). The second lesson, entitled "Shut Down by Tin Lizzie," acquaints the student with some of the changes the autombile brought to the U.S. small town. The student is asked to think about the ways people live together and the quality of life; these are often affected by rapid change. The third unit, entitled "The City of Windshields," focuses on Los Angeles and some of the effects of the automobile on the design of the city and on the everyday lives of the people who live there. The final activity, entitled "The Car on Trial," asks the student to investigate the problems caused by the car in the U.S. and to weigh the merits of the car against the problems it has produced. The teacher's manual covers the following topics: overview, objectives, target audience, materials, time allotment, teaching strategies, and student questions. The student guide contains text, charts, tables, questions, and exercises.

by Barbara Childs; Arthur Goldman; Bettie Johnson; Leon Scipio; Donald R. Harvey
National Science Teachers Assoc., Proj. for an Energy-Enriched Curriculum
DOE-EX-76-C-10-3841
Rept. No. DOE/IR/3841-3-Rev. ; 1979 ; 43p refs
CLEARINGHOUSE TRAINING MATERIALS.
Availability: Dept. of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tenn. 37830

HS-027 175

ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS

In an effort to determine whether differences existed in the characteristics of collisions involving motorcycle drivers classified as sober, had been drinking, or impaired, 214 fatal motorcycle accidents were examined in terms of eight driver/crash variables: driver age and occupation, hour of crash, collision type, victim action, accident location, and road surface and type. Four variables (age, action, hour, and collision type) were found to be significantly related to BAC (blood alcohol concentration) and to account, in aggregate, for 32% of the variance in BAC. Age and BAC were found to have a curvilinear relationship, such that increases in age were associated with higher average BAC'S up to age 20-24, beyound which mean BAC decreased with age. Average BAC's for daytime fatalities were substantially lower than those for nighttime fatalities. Mean BAC for persons killed, when their driving action was judged in error, was significantly higher than that of victims whose action was judged correct. Victims of single-vehicle crashes had, on the average, significantly higher BAC's than victims of multiple-vehicle collisions. The results of this study confirmed the overrepresentation of young drivers among fatally injured motorcyclists, but did not confirm the presence of low BAC's among this group.

by M. A. Buhlman; H. M. Simpson; R. A. Warren
Publ: Canadian Society of Forensic Sciences Journal v12 n2 p65-74 (1979)
1979 ; 13refs
Based on paper presented at Annual Meeting of Traffic Injury Res. Foundation of Canada, Toronto, 1 Jun 1978. Research sponsored by Non-Medical Use of Drugs Directorate, Health and Welfare Canada. French summary.
Availability: See publication

HS-027 176

LIGHTER AND LIGHTER. 2ND ANNUAL PLASTICS REFERENCE (AUTOMOTIVE APPLICATIONS)

New plastic materials and processing advancements are examined which are heralding the introduction of an increasing number of lightweight structural and functional plastic parts for U.S. automobiles in the 1980's. Ford is concentrating on compression and injection molding, to reach its near-term objective of adding 90 to 140 lb of plastic to each car by 1985. The first graphite-fiber-reinforced plastic composite part will be an air conditioner mounting bracket on some 1980 Ford cars equipped with 2.3 L engines. Suspension and structural parts, and prop shafts are likely future applications of the graphite composite. A foam backing has been developed for a new General Motors (GM) one-piece headliner unit. The foam, called Amocor (Amoco Foam Products Co.), is thermoformable. Future applications may include rear shelves, angel wings, and door panels. General Electric has developed a family of epoxies with characteristics that eliminate most processing problems; this new type of epoxy will remain in a moldable consistency until a critical temperature is reached. For the first time, epoxy resins will be able to handle a number of processes. Arnox series 3000 liquid resins will likely be the first epoxies to meet automotive part mass production requirements. Currently forecast by GM to reach around 255 lb per car by 1985, plastic use could reach 300 lb if some technological obstacles are overcome. In the international market, a number of plastic resins developed by the Anic company (Italy) are being used in various automotive applications (e.g. seat shells, radiator grilles). Scott Paper Co.'s polyurethane foams are being used for four basic automotive functions: filtration, sound absorption, reservoiring/delivering, and cushioning. A major weight-saving feature of Chrysler's 1980 model line is a bumper guard system on the Chrysler 300 and Dodge Mirada models, which uses a urethane "bun" vs. a hydraulic system. GM's X type cars contain a new window regulating system which relies on a new elastomeric polyester "EPS" tape, and a number of other Du Pont resin parts.

by Michael K. McCann
Publ: Automotive Industries v159 n9 p38-47 (Sep 1979)
1979
Availability: See publication

HS-027 177

DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT

A prototype Self-Powered Vehicle Detector (SPVD) was developed to eliminate the lead-in or interconnecting cables associated with conventional vehicle detectors. The battery-operated detection system detects a vehicle's magnetic signature, processes it, and then transmits vehicle presence information from its roadway position to a nearby receiver control unit. The SPVD requires minimum installation time and cost, little maintenance, and is capable of detecting vehicles on any standard roadway surface. The system consists of two units, the roadway implanted sensor and a control unit, located inside a traffic instrumentation enclosure less than 500 ft away. The SPVD sensor unit is placed in a standard roadway bore hole located in the center of the lane just beneath the surface. The estimated lifetime for a traffic flux of 20,000 vehicles/day is greater than one year. The development of the sensor (magnetometer), FM transmitter, microstrip antenna, and digital encoder/decoder circuitry is described. Also included are FM-receiver and sensor power source (battery) evaluations as well as SPVD fabrication schematics, drawings, and printed circuit artwork.

by John F. Scarzello; Daniel S. Lenko; Albert D. Krall; Robert E. Brown
Naval Surface Weapons Center, White Oak Lab., Silver Spring, Md. 20910
FHWA-P.O.-6-3-0180
Rept. No. FHWA-RD-79-89; NSWC/WOL-TR-78-177 ; 1978 ; 234p 35refs
Rept. for Nov 1976-Sep 1978.
Availability: NTIS

HS-027 178

SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE

The influence of compression ratio, temperature of the charge air, and ignition timing on the performance of the turbocharged (TC) gasoline engine is discussed, as well as the importance of recooling the charge air and setting the ignition timing very precisely. Calculations of the realistic effective efficiencies for a TC and a naturally aspirated gasoline engine of about the same power output show the advantage of the TC engine. The interaction of compressor and engine is examined through a compressor/engine air flow map of the TC gasoline engine, and comparisons are made with the TC diesel engine. The features of a compressor matching the special requirements of a TC gasoline engine are deduced from the map. The position of the throttle in the intake system is discussed, which has a great influence on governing qualities and load-change response of a TC gasoline engine. A main problem of the TC gasoline engine appears to be that of regulating the charge pressure while maintaining turbine efficiency. Adjustment of charge pressure by means of a waste-gate is rejected as an approach for the TC gasoline engine.

by Hermann Hiereth; Gert Withalm
Daimler-Benz A.G., Germany
Rept. No. SAE-790207 ; 1979 ; 12p 7refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 179

PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS

The gradual adoption of plastic components in the mechanisms of windshield wiper systems, as acceptable materials have become available, is described. Plastic material developments have brought designers desirable characteristics, such as higher tensile strength, resistance to fatique, service at greater temperature extremes, lower coefficient of friction, self-lubrication, electrical insulating properties, and resistance to heat aging, oxidation, and weathering. A windshield wiper set, consisting of motor, linkage, arms, and plastic blades, now contains 8% plastic by weight. A washer set, consiting of pump, reservoir, and nozzles, contains 73% plastic by weight. These percentages are leaders in the use of plastics in the automotive industry (a typical 1978 model car contains 5% plastic by weight). The plastic wiper blade, as an example of one application, offers the following qualities: uniform cleaning of windshield throughout the length of the blade over various windshield curvatures and with wide range of wiper arm loads specified by car manufacturers for different models, reversal of element at start of wiping stoke, low friction, windlift resistance, quiet operation, endurance, and weight reduction.

by Richard A. Batt
Trico Products Corp.
Rept. No. SAE-790201 ; 1979 ; 14p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 180

CARBURETOR DEPOSITS AND THEIR CONTROL

The effects of unleaded gasoline properties on the formation of carburetor deposits were studied by analyzing data from six field tests and by conducting a laboratory engine test program to investigate a wide range of gasoline properties. It was found that stable, low gum content, nonadditive-containing, unleaded gasolines form deposits throughout the carburetor in field tests independent of vehicle type, service, or tested gasoline properties. Sulfur, nonbasic nitrogen, and existent gum in gasoline increase carburetor throttle body deposits, but carburetors are not deposit-free when these components are essentially eliminated. Olefins in gasoline and 10% and 90% evaporation temperatures also adversely affect throttle body deposits. The only current practical way to control carburetor deposits of volatile, stable, low gum content gasolines is to use an effective DC (deposit control) additive. Such an additive can also clean up and keep clean critical areas of a new design variable venturi carburetor. Fleet fuel economy differences are difficult to determine unless many cars are on test or unless operation and maintenance variables are closely controlled. In one test, an mpg benefit of about 2% was found for a DC additive-containing fuel over nonadditive, unleaded gasoline.

by L. M. Gibbs; C. E. Richardson
Chevron Res. Co.
Rept. No. SAE-790202 ; 1979 ; 20p 20refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 181

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE

Fuel composition and additive (antioxidant and detergent) effects on intake system cleanliness were studied using Japanese automobile engines equipped with exhaust gas recirculation systems. It was found that deposit formation in the intake system (carbuetor and intake manifold) is likely to be greater when the engine is operated at medium speed and medium load. Higher fuel olefin content markedly increases deposit formation in the intake system, and antioxidants can increase deposit formation. Fuel aromatics do not adversely affect carburetor or intake manifold cleanliness. A detergent greatly improves carburetor and intake manifold cleanliness, but shows little or no effect on intake valves. The cleanliness effect of a detergent additive is greater when it is used with a "dirty" base gasoline. Intake valve deposits are greater with higher olefin fuels. Aromatics do not affect total deposits but increase the ratio and weight of the organic insoluble portion. Carrier oil/detergent combinations markedly reduce intake valve deposits. An increase in the aromatic content of the fuel appears to augment cylinder head deposits.

by T. Nishizaki; Y. Maeda; K. Date; T. Maeda
Nippon Mining Co., Ltd.
Rept. No. SAE-790203 ; 1979 ; 16p 14refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Part of research conducted by KYODO OIL group companies (Kyodo Oil Co., Asia Oil Co., Fuji Oil Co., Kashima Oil Co., and Nippon Mining Co.).
Availability: SAE

HS-027 182

A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES

A laboratory bench rig procedure has been developed for the evaluation of dispersant-detergent gasoline additive effectiveness used for the control and/or inhibition of carburetor and engine intake system deposits. The development of a synthetic crankcase off-gas liquid made possible the bench procedure which provides data that correlate with actual engine results in the carburetor throttle plate and throat area, in the induction system (port and valve areas), and in additive effectiveness. The repeatibility of the procedure is good, and the apparatus, simple in design and operation, permits simultaneous evaluation of carburetor and intake deposits. The fuel requirement is small (1080 ml), and the test can be run in an 8-hr working day. The air-fuel mixture impinges on the depositing surfaces at (scrubbing) velocities found in an intake system. The temperatures of the depositing surfaces are comparable to those found in the carburetor (cold) and at the intake valve and/or port areas (hot). A broad evaluation-correlation of dispersant-detergent additives to actual engine test fleet operations is necessary for validation purposes. Additional work is recommended on carburetor sleeve design.

by H. W. Marbach, Jr.; A. A. Johnston; J. N. Bowden; M. E. LePera
Southwest Res. Inst., Army Fuels and Lubricants Res. Lab., San Antonio, Tex.; Army Mobility Equipment Res. and Devel. Command, Energy and Water Resources Lab., Ft. Belvoir, Va.
Rept. No. SAE-790204 ; 1979 ; 15p 8refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 183

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS

The diesel engine line of the Volkswagen Group has now been expanded from the VW Rabbit 4-cylinder engine to 5- and 6-cylinder engines developed for passenger cars (Audi 100) and light-duty trucks (VW LT truck line), respectively. As in the 4-cylinder version, these engines employ the swirl chamber process. They are in-line, overhead camshaft configurations with bucket tappets and with valves parallel to the cylinder axis. Cylinder volume is 400 cu cm. Power output of the 5-cylinder engine is 50 kW, with 60kW for the 6-cylinder engine, both at a rated speed of 4800 rmp. Cast iron cylinder blocks and aluminum cylinder heads are used. The basic design, development highlights, and performance characteristics (e.g. power, durability, emissions, and fuel economy) are described for the two engines. The VW/Audi diesel-powered vehicles meet all emission standards for the 1979 model year, worldwide. Additional technology development is required to ensure compliance with future U.S. emission standards for nitrogen oxides and particulates. Further improvements need to be made with regard to driver comfort, idle noise, and elimination of preheating time requirements. Current developments in exhaust gas turbocharging are promising for increasing the power output of the diesel to that of present naturally-aspirated gasoline engines. The diesel-powered vehicle offers better fuel economy than its gasoline-powered counterpart.

by Karlhans Sator; Werner Buttgereit; Ulrich Sturzebecher
Volkswagenwerk A.G., Germany
Rept. No. SAE-790206 ; 1979 ; 28p 3refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 184

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM

Surveys were conducted and an examination was made of the extent of false identification (ID) use in the U.S. in six major problem areas: drug smuggling, illegal immigration, fugitives from justice, fraud against business, fraud against government, and other criminal activity. Common identification documents include: birth certificate, driver's license, U.S. passport, U.S. visa and alien ID card, Social Security card, Selective Service draft card, voter registration card, credit cards, and nongovernment ID. Findings, background material, recommendations, and plans are presented for implementing the proposed solutions of the Federal Advisory Com. on False Identification (FACFI). Appendices offer a comprehensive source of current information on the false ID problem: FACFI Task Force reports, four background papers by the MITRE Corp. (three reports on technological aspects of the personal identification problem, and a broad survey of the false ID problem as perceived in several foreign countries); descriptions of programs developed by MITRE (under contract to the Law Enforcement Assistance Administration) for reducing the abuse of birth certification, for matching birth and death certificates, and for improving driver's license security; and a proposal by Polaroid Corp. to upgrade driver's license security. Additional appended material includes excerpts from an underground publication on techniques used in false identification; a letter from the Western States Bankcard Assoc. on false ID fraud, a summary of Federal laws relating to false ID, and three responses received by FACFI expressing strong disagreement with specific committee findings or recommendations.

Department of Justice, Federal Advisory Com. on False Identification, Washington, D.C. 20530
1976 ; 719p refs
Under contract to the Dept. of Justice, MITRE Corp. provided technical and editorial support.
Availability: GPO, stock no. 052-003-00226-4

HS-027 185

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC

Twelve subjects were selected for a comparison of driver and passenger psychophysiological reactions in vehicles with automatic transmission and with manual transmission in heavy city traffic. Each subject underwent four test runs, as a driver and as a passenger with each transmission. The physiological parameters recorded from driver and passenger were urinary excretion rates of adrenaline and noradrenaline, skin conductance responses (SCR), skin conductance levels (SCL), electromyograms (EMG) from the forehead muscles, and electrocardiogram (ECG). Each test run on the 14 m circuit course consisted of four complete circuits. In drivers, significant differences were found only between driving with automatic and manual transmissions. Other factors, such as sequence of testing or time of day, had no significant effects. When driving with manual transmission, rate of adrenaline excretion, SCR, heart rate, and heart rate variability were significantly higher than when driving with automatic transmission or riding as a passenger. No significant differences were observed between these two situations. The passenger situation resulted in significantly lower muscle tension than either driving situation. A comparison between first and second runs showed significantly lower values for SCR, muscle tension, and heart rate of passengers on the latter. It is indicated that central arousal rather than physical workload is the major factor responsible for the differences between driving with manual and automatic transmissions. In the driving situation, this defense-alarm reaction can be inappropriate. Physically, the driver has to remain rather passive, although his physiological arousal level is in a state ready for a stronger physical activity.

In city traffic, stress reduction due to the use of an automatic transmission may constitute a valuable measure for improved health and traffic safety.

by H. Zeier
Publ: Ergonomics v22 n7 p799-810 (Jul 1979)
1979 ; 20refs
Sponsored by Zahnradfabrik Friedrichshafen und Bayrische Motorenwerke Munchen (Germany). Includes German summary.
Availability: See publication

HS-027 186

ADULT AGE AND THE SPEED-ACCURACY TRADE-OFF

The possibility was investigated that previously reported age differences in speed performance were caused by older subjects placing more emphasis on accuracy than younger subjects. The speed and accuracy with which three different samples of young and old subjects performed variations of a manual task (pressing different buttons in response to lighted lamp patterns) were recorded and analyzed statistically. The major conclusion is that while a greater emphasis on accuracy rather than speed is definitely a factor contributing to the slower performance of older adults, it probably cannot account for all of the age differences in speed of performance. A speed-accuracy tradeoff did seem to be responsible for all of the age differences observed in one experiment, but sizeable age differences remained after the elimination of differential accuracy biases in the second and third experiments. The differences observed across experiments serve to emphasize the importance of sample specification in research on aging. Although it appears that the speed-accuracy tradeoff procedures can make only a limited substantive contribution to the understanding of age differences in performance speed, the methodological contribution seems unlimited. Speed-accuracy operating characteristics do not have the interpretation problems associated with traditional reaction time measures, and can be obtained in naive, unpracticed subjects; the procedures are therefore valid for research on individual differences. It is highly recommended that subsequent research use these procedures to quantify factors related to age difference in speed.

by Timothy A. Salthouse
Publ: Ergonomics v22 n7 p811-20 (Jul 1979)
1979 ; 14refs
Sponsored by Washington Univ., St. Louis, Mo. and Univ. of Missouri Graduate School, Columbia, Mo. Includes French and German summaries.
Availability: See publication

HS-027 187

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE

Three experiments were performed to investigate the effects of vibration frequency, level, and duration on a zero order, pursit tracking task, and the mechanisms responsible for these effects. The first experiment investigated the effect on tracking performance of vertical, sinusoidal vibration of the control stick in the frequency range 4 to 64 Hz. Control dynamics were either isotonic (displacement), isometric (force) or spring-centered. The second experiment investigated the effect of level of vertical, 4 Hz and 16 Hz whole-body and control vibration on performance with the isotonic and isometric controls. A third experiment investigated the effects of duration of continuous, vertical, whole-body vibration at 4 Hz, for durations up to 1 hour, on performance with the isotonic and isometric controls. Performance measures included closed-loop transfer functions of the human operator and components of mean-square tracking error correlated with the forcing functions and vibration, and those due to operator-generated noise or remnant. The results indicate that the primary effects of vibration on the tracking task were increases in remnant and vibration-correlated error. Perceptual and motor sources are suggested for the increased remnant. The effects were largest with 4 Hz vibration and were found to be effectively constant throughout 1-hour exposures to continuous 4 Hz whole-body vibration, but after relatively short periods the effect on overall tracking performance was effectively masked by large increases in response lags and suppression of coherent responses which occurred in both static and vibration conditions as a consequence of diminished levels of arousal.

by Christopher H. Lewis; Michael J. Griffin
Publ: Ergonomics v22 n7 p855-89 (Jul 1979)
1979 ; 24refs
Sponsored by Ministry of Defence (U.K.). Includes French and German summaries.
Availability: See publication

HS-027 188

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION

The concept of charge stratification is examined, using a numerical model for fluid mechanics and chemical kinetics. Initially homogeneous and stratified charge cases are discussed and compared, and simplified global rate expressions for the chemical reactions are compared with a detailed reaction mechanism. Results computed for the stratified models indicate that the fuel can be completely burned before it reaches the walls of the combustion chamber, effectively eliminating wall quenching as a source of unburned hydrocarbon emissions, but volume flame quenching appears to result in unacceptably large amounts of unburned fuel in the stratified models.

by Charles K. Westbrook
University of California, Lawrence Livermore Lab., Livermore, Calif.
W-7405-ENG-48
Rept. No. SAE-790248 ; 1979 ; 16p 7refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 189

SPEED LIMITS. SAFETY SUCCESS OR MUDDLED MEDDLING?

Evidence for urban and rural speed limits in Great Britain is reviewed, and the concept that they help prevent accidents is disputed. The saving in fuel brought about by lower speed limits is also described as negligible. Since in Britain the majority of all accidents, including serious and fatal accidents, take place in built-up areas, the overall influence of an open-road limit must be small. A 1967 investigation in America found that the accident involvement rate is lowest at about the average speed of all traffic and highest at very low and very high speeds. In a recent study of overtaking maneuvers the basically accepted correlation between speed and seriousness of injuries is not reflected. It is contended that any accident reduction claimed as a result of the 50 mph limit imposed was actually a result of the reduction in traffic flow caused by the oil crisis, with its resultant shortage and higher cost of gasoline. A reduction of accidents in urban areas following the introduction of the original 30 mph limit in 1935 is attributed to major road improvements and other safety measures. A 1973 review by the Metropolitan Police of speed limits on London's main roads recommended retention of the 30 mph limit on residential roads but allowing higher limits on 176 miles of London's roads with limits changed in one or two cases from 40 mph to 70 mph. To illustrate the improvement in wet-road braking performance between modern cars and those of the '30s, a comparison test was run with a recording fifth wheel. Due to the marked inferiority of their tires and brakes, the cars typical of 1935, when the 30 mph speed limit was introduced, proved far worse at stopping on a slippery surface than modern cars; it is therefore argued that the urban speed limit could safely be raised to 40 mph.

Publ: Motor v156 n4017 p38-41 (3 Oct 1979)
1979
Availability: See publication

HS-027 190

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE

In order to better appreciate the effects of various combustion factors on NOx formation in stationary, reciprocating spark-ignition engines, a phenomenological model of combustion in a 20-inch bore two-cycle natural gas engine is described. Several characteristics distinguish the combustion in large-bore engines from ordinary automotive engines: low rpm and associated long combustion duration, natural gas fuel, multiple spark plugs, lean operation, substantial unmixedness due to direct gas injection during compression, and low surface to volume ratio. All the combustion conditions which make large-bore engines relatively efficient prime movers also make them produce relatively high levels of NOx. This study is part of a long-range research program to develop combustion modifications for 1985-1990 models of large-bore engines. The model accounts for "unmixedness" of the initial charge, stratification, and temperature gradients arising from successively burned zones. Predictions are compared with experimental data for the effects of variations in timing, fuel-air ratio, stratified charge, EGR, and turbulence; these indicated the possibility for substantially reduced NOx emission levels under a variety of operating conditions.

by R. P. Wilson; A. A. Fowle; W. J. Raymond; W. J. McLean
Arthur D. Little, Inc.; Cornell Univ.
EPA-68-02-2664
Rept. No. SAE-790293 ; 1979 ; 12p 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 191

LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE

Forty-one papers are compiled, related to highway engineering and technology of low-volume roads. Subjects covered include types of road surfaces and maintenance experiences, bridge inventory and inspection, low water crossings, a durable reflective sign system, and earthwork practices in cold weather. Also discussed are integrated rural road systems and road network analysis, evaluations of road roughness and its effect on vehicle operating costs, fuel consumption related to vehicle type and road conditions, road improvement measures, and highway safety requirements. Reports are contributed by developing countries as well as those with longer experience in highway maintenance, including Australia, Barbados, Bolivia, Brazil, Egypt, Gambia, Israel, New Zealand, Republic of South Africa, Tanzania, Thailand, U.K., and U.S.A.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-702 ; 1979 ; 349p refs
Proceedings of International Conference on Low-volume Roads, 2nd, Iowa State Univ., 20-23 Aug 1979. Includes HS-027 192--HS-027 198.
Availability: TRB $18.00

HS-027 192

EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN

The effect on vehicle operating costs of a simple labor-intensive method of rehabilitating and maintaining badly deteriorated bitumen surfaced roads in the Eastern Caribbean is described. The techniques developed for the rehabilitation and maintenance of the roads are described, and the equipment, materials and manpower required are listed. The system is a simple one, restricted to providing adequate drainage, filling the potholes in the road and providing a minimum seal over the whole road surface. The most effective method of surface dressing was found to be labor-intensive sandsealing. In this method, RC 2 bitumen is poured on the road surface at a rate of approximately 0.27 litres/sq metre (0.2 gals/sq yard), spread with rubber squeejees, then covered with a layer of sand 25 to 30 mm thick; the sand is then lightly rolled. The reduction in vehicle operating costs resulting from the improvement in the riding quality of the road surface is sufficient to recover the rehabilitation costs in a short time, even at flows as low as 100 vehicles a day. Most roads in this plan are of low strength and geometric standards, and have traffic flows ranging from 50 to 1500 vehicles per day. All the roads have been trafficked for at least one year since rehabilitation and some for two with little or no damage to the surface. Maps and photographs are included.

by H. Hide; D. Keith
Transport and Road Res. Lab., UK; British Devel. Div. in the Caribbean, Barbados
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p269-76
Rept. No. PA525/78 ; 1979 ; 3refs
Conference held at Iowa State Univ., 20-23 Aug 1979.
Availability: In HS-027 191

HS-027 193

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS

A study was made to reevaluate the safety needs on low-volume rural (LVR) roads. Based on a series of functional analyses relating safety performance to specific design and operational elements, a set of revised guidelines was developed. These guidelines, which apply to total roadway width, horizontal curvature, roadside design, speed signs, curve warning signs, centerline markings, and no-passing stripes, are proposed to supplement the existing national policies, either replacing or clarifying the existing national guidelines. The widespread application of the revised guidelines should provide for more consistent design and traffic control of LVR roads consonant with a raional balance between highway investment, highway safety, and traffic service. Two basic kinds of studies are recommended to continue this research: those to collect accident data on LVR roads for a clearer picture of their current safety performance, and those to collect on-site data of LVR traffic characteristics, to verify the revised safety requirements.

by John C. Glennon
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p286-94
1979 ; 30refs
Conference held at Iowa State Univ., 20-23 Aug 1979. Research sponsored by American Assoc. of State Hwy. and Transportation Officials and the Federal Hwy. Administration.
Availability: In HS-027 191

HS-027 194

A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS

Due to extreme temperatures and snow burial, the reflective sheeting often peels from the signs on National Forest park land after only one winter. In 1972 the Forest Service Missoula Equipment Development Center began testing outdoor signs of various substrates, reflective sheeting, application techniques, and clear coatings, hoping to produce a reflective sign that would remain maintenance-free for seven years. After five winters of outdoor exposure, several combinations of sign material were rated free of structural failure that would require maintenance. The following materials and techniques were recommended in manufacturing outdoor reflective signs for Forest Service use: engineering-grade sheeting and letters with heat-activated adhesive (HA) on aluminum substrate, cycled twice through the heat vacuum applicator and clear coated; engineering-grade sheeting (HA) and pressure-sensitive (PS) or HA letters on high-density overlay (HDO) plywood substrate, cycled twice through the heat vacuum applicator (when PS letters are used, the sheeting is cycled through the heat vacuum applicator once before applying the message and once after); high-intensity sheeting (PS) with heat-activated letters on HDO plywood substrate, cycled once through the heat vacuum applicator. Signs are equally durable with silk-screened letters. The top edges of all signs are protected with Scotchcal brand transparent film. Photographs and data tables are included.

by Tom Nettleton
U.S. Forest Service
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p295-303
1979
Conference held at Iowa State Univ., 20-23 Aug 1979.
Availability: In HS-027 191

HS-027 195

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL

The design and methodology of the survey of vehicle operating costs on rural and inter-urban roads in a large area of central, western, and southern Brazil is described. Data were collected from 117 operators for 1326 vehicles by a team of 20 researchers. Road roughness and geometric characteristics were measured on 423 routes totalling nearly 40,000 km in length, using two specially instrumented cars. The method of analysis is explained and some preliminary relationships are presented and discussed. Special attention is given to depreciation and vehicle maintenance costs. An example is used to show that on typical unpaved roads, increases in fuel consumption are smaller than on paved roads in relation to the overall increase in costs. Road geometry appeared to have powerful effects on fuel consumption while road roughness had the most important influence on total vehicle operating costs. Analysis will continue until Nov 1979.

by Richard J. Wyatt; Robert Harrison; Barry K. Moser; Luiz A. P. De Quadros
Texas Res. and Devel. Foundation; Empresa Brasileira de Planejamento de Transportes
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p313-9
1979 ; 7refs
Conference held at Iowa State Univ., 20-23 Aug 1979.
Availability: In HS-027 191

HS-027 196

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL

An overview is given of a 12 million dollar research study, jointly supported by the Brazil Ministry of Transport and United Nations Development Program, to determine the relationships between vehicle user costs, roadway design standards, and maintenance policies for low volume roads. The relationships are based on an analysis of data generated in a survey of vehicle users operating on over 60,000 km of homogeneous paved and unpaved routes. Up to two years of user costs data have been produced on over 1200 vehicles, together with 450,000 observations based on radar speed measurements of vehicle behavior plus fuel measurements from nine project test vehicles. Data developed from 187 paved and unpaved roadway test sections are being used to develop equations to predict road performance. The relationships between vehicle-operating costs and roadway characteristics, traffic and environmental conditions are being incorporated into a computer-based planning model, MOBAIR, to be used for evaluating alternative highway transportation strategies. Charts and diagrams illustrate aspects of the study.

by Bertell C. Butler; Jose Teixeira de Carvalho; William R. Hudson
Texas Res. and Devel. Foundation; Empresa Brasileira de Planejamento de Transportes; University of Texas at Austin
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p320-7
1979 ; 4refs
Conference held at Iowa State Univ., 20-23 Aug 1979.
Availability: In HS-027 191

HS-027 197

FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS

An investigation of the effect of road condition and vehicle type on fuel consumption was conducted in Brazil. A test fleet of nine vehicles ranging from a Volkswagen to an articulated truck was used to perform nine experiments. Roadway characteristics studied include horizontal curvature, grade, surface type, and roughness. Vehicle operating modes studied include constant speed, acceleration, deceleration, and deceleration due to gravity. An experiment was also performed on the effect of adding 20% alcohol to gasoline, which resulted in an increase in fuel consumption of approximately 10%. Regression equations for predicting fuel consumption as a function of speed and vehicle and roadway characteristics were developed for constant speed operation. These equations, one for each vehicle type, show that fuel consumption is exponentially related to speed, weight, gear, grade, and surface roughness. Curves of 72 m in radius did not have a significant effect on fuel consumption. Charts and graphs illustrate the study.

by John P. Zaniewski; Barry K. Moser; Pedro Jose De Morais; Russ L. Kaesehagen
Texas Res. and Devel. Foundation; Brazilian Road Res. Inst.; Western Australia Main Roads Dept.
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p328-34
1979 ; 6refs
Conference held at Iowa State Univ., 20-23 Aug 1979.
Availability: In HS-027 191

HS-027 198

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS

A major expermental investigation of the effect of roadway characteristics and environmental conditions on traffic behavior was conducted in Brazil. Empirical relationships were developed for predicting free speeds on positive and negative grades. Free speed was found to be related to vehicle class, grade, surface type, and road roughness. These relationships have been incorporated into a computer program, TAFA, for predicting travel time, free speed, and fuel consumption on low-volume rural roads. Example applications of the model show its usefulness in evaluating operational and road maintenance strategies which are of interest to highway engineers and economic analysts.

by John P. Zaniewski; Barry K. Moser; Joffre D. Swait, Jr.
Texas Res. and Devel. Foundation; Empresa Brasileira de Planejamento de Transportes
Publ: HS-027 191 (TRR-702), "Low Volume Roads: Second International Conference," Washington, D.C., 1979 p335-41
1979 ; 3refs
Conference held at Iowa State Univ., 20-23 Aug 1979.
Availability: In HS-027 191

HS-027 199

MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT

To assist the Michigan Dept. of Transportation in developing plans for a state motor vehicle inspection program, a state-wide public opinion survey of Michigan drivers was conducted. A sample of 999 drivers was contacted by telephone or mail between May and Aug. 1979, with an 86% response rate. The questionnaire focussed particularly on the desirability of emissions inspections and a slight plurality of the sample (47.9%) were in favor of such a program. Much larger proportions of the sample favored safety inspection (83%), noise inspection (67%), and a combined safety and emissions inspection (73%). More than half preferred that any inspection program be paid for by other state funds rather than by an inspection fee, and majorities in all parts of the state thought an emissions inspection program should be statewide if it were established. Complete survey results are included. Appendices include 45 tables, a narrative listing of interesting respondent comments, copies of the questionnaires and respondent letters, and some methodological notes.

by Arthur C. Wolfe
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
MVI-79-001A
Rept. No. UM-HSRI-79-60 ; 1979 ; 122p 2refs
Rept. for May-Aug 1979. Sponsored by Michigan Office of Hwy. Safety Planning.
Availability: Corporate author

HS-027 200

CHANGEABLE MESSAGE SIGNS

A synthesis of detailed information on the effectiveness and application of changeable (variable) message signs was prepared for use by engineers concerned with traffic operations and control. Information is provided on requirements for design, installation, operation, and message effectiveness. Previous and current research is reviewed and future development needs are identified. A discussion of various types of displays is presented, followed by a description of control systems, surveillance, and interconnect techniques. Features of freeway traffic advisory and incident management systems are considered. Their applications include freeway-to-freeway diversion, special events notification, adverse road or weather conditions warning, and speed control. Areas of future technology research are discussed. Appended are potential applications of changeable message signs and known applications as of 1978.

by Conrad L. Dudek; Thomas L. Copas; Herbert A. Pennock; Gay I. Leslie, ed.
Transportation Res. Board, 2101 Constitution Ave., Washington, D.C. 20418; Texas Transportation Inst., Transportation Systems Div.
Rept. No. NCHRP-Synthesis-61 ; 1979 ; 47p 27refs
Availability: TRB

HS-027 201

SLIP THROUGH THE WIND. (AUTOMOBILE AERODYNAMICS)

Pininfarina, body builders and stylists for some of the best automobile manufacturers in Europe, attempted to define an aerodynamically-ideal car body in 1976. Researchers wanted to create a three-dimensional full-scale model, considering production constraints and prevalent standards. In addition to that offered by tires and mechanical components, aerodynamic resistance has been classified in terms of skin friction, profile drag, interior drag, and induced drag. Form drag is minimized in Pininfarina's model by assuring that the car body's cross-section varies gradually and that pressure variations along lines of flow are also gradual. Car stability depends on whether the center of pressure is in front of the center of gravity or vice versa. Simple alterations like rounding edges of a boxy car body can affect both the center of pressure and the magnitude of force induced by side winds. Pininfarina's basic shape has been tested in a wind tunnel, and interior studies have been conducted. Reduced fuel consumption has been demonstrated. Photographs are included. A separate section briefly describes the Citroen CX, the world's most aerodynamically advanced production car.

by L. J. K. Setright
Publ: Car and Driver p73-6, 78, 80-1 (Nov 1979)
1979
Availability: See publication

HS-027 202

RED LIGHT FOR DRINK (SIC) DRIVERS

An electronic breathing device to screen drunk drivers is examined. Manufacturers of the Alcolmeter (Lion Labs, England) claim the device is accurate to within 10 mg of alcohol per 100 ml of blood and should reduce needless arrests and inconvenience to innocent motorists. The device is the size of a pocket tape recorder and incorporates an electrochemical fuel cell that generates voltage in proportion to the amount of alcohol in breath samples. If a red light flashes, this indicates the alcohol level in a sample is above 80 mg. Alcolmeters are compared with conventional breath analysis techniques. Their use in Sweden, Finland, Northern Ireland, the United States, and the United Kingdom is noted.

Publ: Motor v156 n4018 p2 (10 Oct 1979)
1979
Availability: See publication

HS-027 203

IT'S MOPED TIME!

The increased popularity of mopeds is addressed, with reference to maintenance and variations in laws governing their use. The Moped Association of America estimated 350,000 moped sales in 1979, a significant increase over 50,000 in 1975. Forty companies manufacture mopeds, including two U.S. companies (AMF and Columbia). Low-priced models cost about $400, while "luxury" mopeds cost about $630. Mopeds get over 100 miles to the gallon, some as much as 200 miles. A publication of the Arizona Governor's office of Highway Safety indicates that moped drivers are less likely to be involved in traffic crashes than motorcyclists; when mopeds crash, however, the rider's risk of injury is similar to that of the motorcyclist. The injury risk for drivers of motorized two-wheel vehicles in a crash is 10-15 times higher than for car passengers, and helmet use is strongly advocated. Of 33 States with special moped legislation, only New York has a helmet requirement for mopeds with a maximum speed above 20 mph. Lack of information on the potential danger of mopeds is noted. Maintenance problems are considered.

Publ: Driver v13 n4 p1, 3-6 (Sep 1979)
1979
Availability: See publication

HS-027 204

LAWS, LAWS AND MORE LAWS. STATE-BY-STATE SUMMARY OF MOPED LAWS AS OF AUGUST, 1979

Moped laws are summarized by state as of Aug. 1979. According to the Moped Association of America, all but six States have specific moped laws. Because laws governing the use of mopeds vary widely, a model moped law is being prepared for the National Hwy. Traffic Safety Administration by the National Committee on Uniform Traffic Laws and Ordinances. The summary of State moped laws presents tabular information on minimum age, license rules, registration requirements, speed limit, maximum engine limits, legal definition, mandatory insurance, and mandatory helmet.

Publ: Driver v13 n4 p7-9 (Sep 1979)
1979
Availability: See publication

HS-027 205

WHY CYCLISTS SHOULD RIDE WITH TRAFFIC

The danger to bicyclists who ride facing traffic is emphasized. Studies show that wrong-way cycling is a leading cause of bicycle deaths and injuries. The purpose of traffic laws is to allow road users to rely on the predictability of each other's movements. Participation in traffic requires the cyclist to comply with laws which keep traffic orderly. Riding on the left upsets the orderly pattern. Hazards of wrong-way cycling are identified. The bicycle is a vehicle and this fact has both legal and practical implications. The wrong-way cyclist forces road users to deal with a hazard from a unexpected direction, and there are no traffic rules governing the wrong-way cyclist at intersections. If forced into the roadway, the left-side cyclist has more difficulty than the right-side cyclist, while in turning, the wrong-way cyclist is forced to cross paths with an oncoming car at a moment of neither's choosing. In addition wrong-way cyclists frequently collide with pedestrians and right-side cyclists.

by John Schubert
Publ: Driver v13 n4 p10-3 (Sep 1979)
1979
Reprinted from Bicycling.
Availability: See publication

HS-027 206

COPING WITH INEXPERIENCE

Classroom preparation for motorcycle operators to enhance safety is considered. Motorcycle Safety Foundation and Kawasaki Learn to Ride courses are offered by local high schools and colleges. The "big brother/sister" concept is recommended to cope with inexperience. Interchange with an experienced driver will reveal common do's and dont's: do not borrow or lend; steer left to go right at speeds greater than 10 mph; allow front brakes to do most of the work; take railroad tracks at a direct angle; conduct daily maintenance and pre-ride checks; use the neutral gear at stoplights; do not ride "two-up" without experience; use protective clothing; watch for gravel or water in the roadway; be wary of crosswinds; get insurance; and "keep the shiny side up and the rubber side down".

Publ: Driver v13 n4 p14-7 (Sep 1979)
1979
Availability: See publication

HS-027 207

BACK TO BASICS: TOOLS

Basic information to aid "backyard mechanics" in vehicle repair is presented, with emphasis on tools. Due to the economy, many consumers are becoming interested in doing their own repair work. Most vehicle maintenance is not difficult and requires only a little special knowledge and a modest investment in equipment. Adequate lighting and a workbench are two essentials of a work area. A pair of safety stands, jack stands, or ramps is also needed. Basic tools include a set of open-end combination wrenches, sockets and a socket wrench, a medium crescent (adjustable) wrench, screwdrivers, regular and needlenose pilers, vice-grip pliers, a feeler gauge, a spark-plug wrench, a 12-volt test lamp, and a rubber hammer.

Publ: Driver v13 n4 p22-7 (Sep 1979)
1979
At head of title: The Backyard Mechanic
Availability: See publication

HS-027 208

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1

Data were collected in 1977 from 29 major automobile insurance companies in the United States and from a survey of approximately 60,000 households to analyze information on automobile reparations and on families that experienced injuries from automobile crashes. Detailed findings are presented for three separate studies: insurer study of auto injury closed claims (insurance coverage for highway crash injuries, including bodily injury liability, uninsured motorist, medical, and personal injury protection (PIP) coverage); insurer study of PIP serious injury claims (over $100,000); and consumer panel study of auto injuries. Study methodologies are described, and forms and instructions are included.

Alliance of American Insurers, All-Industry Res. Advisory
Com., 20 N. Wacker Dr., Chicago, Ill. 60606
1979 ; 266p refs
Vol. 2 is HS-027 209.
Availability: Corporate author $15/set of 2 vols

HS-027 209

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2

Statistical data are tabulated concerning automobile insurance reparations and families that experienced injuries from automobile crashes. Data were collected in 1977 from 29 U.S. automobile insurance companies and from a survey of approximately 60,000 households. Tables provide information on an insurer study of auto injury closed claims and on a consumer panel study of auto injuries.

Alliance of American Insurers, All-Industry Res. Advisory
Com., 20 N. Wacker Dr., Chicago, Ill. 60606
1979 ; 415p
Vol. 1 is HS-027 208.
Availability: Corporate author $15/set of 2 vols

HS-027 210

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE

The theory of the LAG process (Russian acronym translated into English as avalanche activation of combustion) is examined. Developed by Gussac, the LAG process uses a dual-chamber engine. The main chamber contains a fuel-lean mixture, and the smaller chamber contains a fuel-rich mixture. When mixture in the small chamber is ignited by a spark, it burns and ejects a jet of hot combustion products into the main chamber. Passage between the two chambers must be of the proper size and shape to optimize the process. Gussac claims that chemically active radicals are generated in the small chamber and are injected into the large one, thus reducing ignition temperature and induction period (i.e. increasing flame speed). His claim is based on Semenov's theory of branching chain reactions. Recent calculations, however, show that flame propagation does not depend on induction type chemistry. The flame produces enough radicals to achieve a steady state radical concentration ahead of the flame. Additional radicals from the prechamber would be superfluous and would raise the temperature only slightly as they are consumed. Alternative explanations for the improved engine performance claimed by Gussac are offered. Further research is recommended to explore these explanations rather than to examine ways of reducing induction time in the main chamber. Semenov's theory is reviewed in an appendix; it is shown that buildup of radical concentrations governs the induction period and that the rate of fuel consumption is determined by the steady-state radical concentration.

by John R. Creighton
University of California, Lawrence Livermore Lab., Livermore, Calif.
W-7405-ENG-48
Rept. No. SAE-790249 ; 1979 ; 20p 5refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 211

THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS

As part of the requirements for a "partial temporary waiver of Highway Safety Program Standard No. 5" granted the State of Virginia, an experimental evaluation was made of several alternative approaches to the requirement that applicants for license renewal be tested on rules of the road at least once every four years. Members of the renewal population of drivers were randomly assigned to four study groups: a control group receiving no treatment; a group receiving only a driver's manual; a group receiving a manual and a test to be taken at home; and a group receiving a manual and requested to take a test in the Dept. of Motor Vehicles examining station when applying for license renewal. The subsequent driving performance of members of the four groups was monitored and data for accidents, major and minor convictions, accidents with associated convictions, and administrative actions under the Driver Improvement Program were tabulated at 6-, 12-, 18-, and 24-month intervals. For the two groups given a knowledge test, few statistically significant differences were found among those who passed, failed, or refused to take the test, none of which suggested the practicality of knowledge testing as an effective highway safety measure. It is therefore recommended that the temporary waiver of the requirement for reexaminations of knowledge of the rules of the road be made permanent, and that the Standard be amended to eliminate the requirement for such reexaminations.

by C. B. Stoke
Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Rept. No. VHTRC-79-R41 ; 1979 ; 81p 17refs
Sponsored by Virginia Dept. of Transportation Safety.
Availability: Corporate author

HS-027 212

DEPARTMENT OF ENERGY UNVEILS ADVANCED ELECTRIC CAR

The Electric Test Vehicle-One (ETV-1), developed as part of the Department of Energy's electric vehicle activities, is an advanced four-passenger subcompact vehicle. Although ETV-1 is a test car, not commercially available, it has been designed to be mass-produced for about $6,400 (1979 dollars) by 1985. The car's 10-year life cycle cost, including electricity for recharging, is estimated to be less than 18 cents per mile. Advanced features of the ETV-1 include: computerized control systems; low-cost high-current power transistor modules to control motor speed; integrated electronics that permit double use of the same electrical circuit to control both motor speed and battery recharging; regenerative braking that captures energy normally lost in braking for use in battery recharging; batteries with 25% higher energy and longer life than those available today; aerodynamic body design, reducing air resistance to 60% of presently available subcompact cars; and extensive use of lightweight materials to reduce overall weight. Computer performance projections indicate a 100-mile driving range at speeds up to 45 mph with two passengers. The ETV-1 can cruise at 55 mph, pass at 60 mph, accelerate from 0-30 mph in nine seconds, and climb a 5% one-mile grade at 50 mph. Eighteen improved lead acid batteries power the car. Engineering and technological efforts in building the car involved $7 million, but only 7% of this figure or about $500,000 went into actual vehicle fabrication.

Publ: Traffic Safety v79 n9 p12-3, 31 (Sep 1979)
1979
Availability: See publication

HS-027 213

HOW WILL DOWNSIZING AFFECT FATALITIES?

The impact of downsizing U.S. cars on motor vehicle fatalities in 1995 is projected. Crash-injury data from files maintained by the Hwy. Safety Res. Inst. at the Univ. of Mich. were applied to police-reported Texas accident data for 1975-1976. These statistics were then projected to the 1995 driver and vehicle population. The emphasis was on determining whether the 1995 fleet of smaller and lighter cars would contribute to more or fewer annual fatalities than a 1995 fleet mix of passenger cars with the size and weight of cars on U.S. roads in 1975. Findings showed that downsizing itself is a slightly negative factor, i.e., downsizing will increase the total annual number of motor vehicle fatalities in 1995 by about 6%. Several other factors, however, will reduce fatalities (roed and traffic signaling improvements, lower percentage of drivers under 25 years of age, passive restraint systems, and other vehicle design improvements) or increase fatalities (projected 25% increase in the number of licensed drivers and 27% increase in the number of passenger cars, likely increase in the average annual mileage per vehicle over the 1975 average of 9,635 miles per vehicle, higher percentage of occupants over 35 years of age, and smaller and lighter cars that decelerate more abruptly in collisions and subject occupants to higher injury-producing forces). Results of accident involvement analysis in Texas are detailed, and supporting data are provided.

by Howard M. Bunch
Publ: Traffic Safety v79 n9 p14-6, 29 (Sep 1979)
1979
Reprinted from HSRI Research Review.
Availability: See publication

HS-027 214

CHILDSAFE GOES NATIONAL

The National Safety Council's Project Childsafe is described. Automobile crashes represent the number one child killer in the United States. Each year, more than 1,000 children under four years of age die in automobile accidents and thousands more are seriously injured. Most crashes occur during routine neighborhood driving, less than 30 miles from home, and at speeds of less than 30 mph. Project Childsafe was started in Wisconsin through sponsorship of the Wisconsin Hospital Association and the Wisconsin Dept. of Public Instruction. The first target group to receive instruction involved new mothers in hospitals. They learned about hazards of permitting young children to travel unrestrained in automobiles in their postnatal classes. The National Safety Council purchased Project Childsafe in 1978 and is mounting an intensive effort to promote it nationwide. The council hopes to encourage parents to use properly tested child restraints for all children under 40 pounds or under four years of age and to warn consumers that some restraints on the market are not crash-tested. The educational program consists of a slide-cassette presentation, a brochure, and a poster that comprise a ready-made community safety education program. Use of the program by hospitals, community groups, clinics, pharmacies, libraries, schools, day care centers, physicians' offices, automobile dealers and other merchants, and the news media is discussed.

Publ: Traffic Safety v79 n9 p18-20, 30 (Sep 1979)
1979
Availability: See publication

HS-027 215

STEERING CLEAR

The inspection and repair of power steering systems to minimize mechanical and safety problems is discussed. Most power steering problems present themselves in the form of a grinding sound when vehicle wheels are turned. A visual inspection of all power steering system components should include a test under pressure to pinpoint the precise origin of a leak. Belts should be adjusted to the correct tension. Power steering analyzers should be employed to detect hydraulic pressure problems. Low pressure can be caused by dirt in the flow control valve or can indicate damage caused by the abrasive action of dirt in the rotor or thrust plate. Pressure can be lost from internal leaks past rack piston rings, the valve body, worm seals, or a misaligned housing bore. Mechanical problems include seized tie rod ends and idler arms, binding steering column universal joints, and steering gear adjustments. Other common problems include stiff ball joints, worn constant velocity joints, bad wheel bearings, and loose bolts on the steering gears. The most important aspect of power steering gear-pump installation is the vehicle road test.

by Bob Cerullo
Publ: Motor v152 n4 p33-5, 37, 39, 41-2 (Oct 1979)
1979
Availability: See publication

HS-027 216

A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY

A survey of automobile repairs, sponsored by the Department of Transportation and conducted by the Johnson Environmental and Energy Center (JEEC), University of Alabama, is reported. JEEC efforts involve the inspection of all car-model years, pickup trucks, and vans since June 1976. One of its Auto Check programs, based on the inspection of 4,000 cars, revealed that: 25% of all repairs were unnecessary and represented 29 cents of every repair dollar. The unnecessary repair rate dropped to 13% when consumers were given detailed information about what needed to be fixed. Control arm pivots, brake disks or drums, and rear wheel seals had high unnecessary repair rates. Local car dealers who performed the most cost-effective repairs had a larger share of the repair business while chain stores with the lowest unnecessary repair rates had the largest business volume. The market share of chains and tire dealers increased with the use of "prescription forms" telling customers exactly what was wrong. Criteria used by the JEEC in setting up the study was examined (106 items on the Auto Check inspection form and the classification of repairs as required, recommended, optional, or unnecessary). The JEEC data sharply contrasted with the findings of the Department of Transportation's "undercover" investigation of auto repair practices and costs in 62 shops, nationwide. That survey found that 53 cents of every dollar spent on auto repair is wasted, and that the consumer has only a fifty percent chance of having a car repaired at the right price.

by Ken Zino
Publ: Motor v152 n4 p18, 22-3 (Oct 1979)
1979
At head of title: Reporter's Notebook
Availability: See publication

HS-027 217

HOW TO CHECK AND REPLACE GASKETS AND SEALS

Replacement work for car gaskets and seals is explained. A gasket makes a seal between two metal surfaces to prevent fluid and/or pressure leaks. The main purpose of oil and grease seals is to protect bearings by minimizing lubricant loss and bearing contamination by dirt and water. According to one industrial source, safety requires greasing front-wheel bearings and installing new seals every 10,000 miles. This interval provides an ideal time for brake inspection. Installation procedures for front-wheel seals, gaskets in general, oil filter gaskets, thermostat gaskets, fuel pump gaskets, oil pan gaskets, and rocker arm (valve) covers are detailed. Illustrations are provided.

by Mort Schultz
Publ: Popular Mechanics v152 n5 p30-2 (Nov 1979)
1979
At head of title: Saturday Mechanic
Availability: See publication

HS-027 218

FUEL FOR THE FUHRER

Captured documents on the German synthetic fuel industry of World War II, with reference to the refining process for making "syncrude" fuel ready to use in motor vehicles, gives the United States a blueprint that can help accelerate development of our nation's coal-conversion process. The need for Germans to develop synthetic fuels was an economic one since the country has little natural petroleum. Coal liquefaction techniques won Bergius a Nobel Prize in 1931. In the Bergius process, coal is ground and mixed with heavy natural or synthetic oil (heavy synthetic oil is made as a byproduct during coal liquefaction). The next step is to push the coal-oil mixture (slurry) into reactors in which the coal liquefaction occurs. The combination of hydrogen, pressure, and temperature breaks down coal into a liquid, and what leaves reactors is synthetic crude oil. To make syncrude ready for use in motor vehicles requires a process similar to that for refining natural crude oil. A distillation process removes volatile components of syncrude. Vapor resulting from distillation is reacted with hydrogen to become liquid fuel. Blending raises the octane of synthetic fuel to meet needs of motor vehicle and aircraft engines. The Fischer-Tropsch process is used to liquefy coal that is low in nitrogen. Historical events in Germany's synthetic fuel development, including Hitler's four-year plan (1939-1942), are traced. Application of the German experience to U.S. energy plans is discussed.

by Mort Schultz
Publ: Popular Mechanics v152 n5 p102-3, 162 (Nov 1979)
1979
Availability: See publication

HS-027 219

GAS-SAVING GADGET...THAT WORKS

A throttle positioner is Douglas G. Noiles' way of getting mor
miles per gallon of gasoline from his car. Noiles, a mechanica
engineer for a surgical firm, primarily attributes decreased fue
economy for automatic transmission cars to the automatic trans
mission which requires high engine idling speeds when no
under load to operate properly with both transmission and ai
conditioner engaged. This condition requires a more ope
"closed throttle" than when the engine is idling, the transmis
sion is in neutral, and the air conditioner is off. The heart o
Noiles' throttle positioner is an ordinary distributor vacuun
advance. The engine chamber is fitted with a support bracket t
permit mounting of the vacuum advance on the antidieselin
solenoid. A hose connects the vacuum advance to a port in th
carburetor base. Manifold vacuum allows the advance to con
trol throttle valve opening. The Noiles throttle positioner i
effective in heavy-load, stop-go situations but does not improv
gas mileage for constant speed driving. To benefit most fron
the device, a car should have an automatic transmission, ai
conditioner, and antidieseling solenoid.

by Mort Schultz
Publ: Popular Mechanics v152 n5 p116-8 (Nov 1979)
1979
At head of title: Fuel For the Future
Availability: See publication

HS-027 220

MAJOR BREAKTHROUGHS IN DETROIT

Four breakthrough applications of plastics in Detroit's 198
model cars are noted. Innovative concepts include a radicall
new window-regulator mechanism fabricated almost entirely c
plastics; an all-polycarbonate (PC) headlamp system; the fir
injection molded one-piece PC instrument panel, and the fir
reaction injection molding (RIM). Value analysis, design an
styling considerations, and the need to save weight provide th
rationale for these innovations. The trend in value analysis is t
bring increased competition among materials and processes, in
cluding renewed interest in structural foam. Reinforced an
otherwise toughened material grades are increasing in use wher
propylene is concerned. Operational, performance, cost, safety
and energy management aspects of innovations in Gener
Motors and Ford cars are detailed.

by A. Stuart Wood
Publ: Modern Plastics v56 n10 p38-41 (Oct 1979)
1979
Availability: See publication

HS-027 221

STRUCTURAL ADHESIVES BID FOR BIG PLASTICS-TO-PLASTICS BONDING JOBS

New formulations of structural adhesives are building c
second-generation formulations that offer fast cure, low exothe
mic heat, and good bond strength. Typical are National Starc
and Chemical Company's Hypac, a two-part acrylic system, an
Weldmaster 3, an interfacial cure system. Both are 100% rea
tive and form tenacious bonds between plastic materials or pla
tics and other substrates (wood, metal, ceramics, etc.). Oth
advances include Hughson Chemicals' Versilok 506 and 51
Versilok 506 is an acrylic structural adhesive for thermosets ar
thermoplastics. The no-mix Versilok 510 system offers he
resistance to 250 degrees F and cures to handling strength

seven minutes at room temperature. The new Futurethane 21 family of urethane adhesives from H.B. Fuller Co. combines speed, flexibility, and high strength for bonding polycarbonate, polyvinyl chloride, polysulfone, treated propylene, and reinforced phenolics. Goodyear Tire and Rubber Co. has one-component urethanes under development. Structural urethanes of Ren Plastics are reported to have good cold and moisture resistance, fast cure, and instant thixotropy. Advantages of new epoxies (Armstrong Products and 3-M) are variable viscosity and flexibility, room temperature or elevated temperature cure, and ability to bond dissimilar substrates. Hot melts, pressure sensitives, and cyanoacrylates are beginning to find new industrial applications, although the relative scarcity of high-speed equipment limits large-scale applications of structural adhesives in industry at present.

Publ: Modern Plastics v56 n10 p48-9 (Oct 1979)
1979
Availability: See publication

HS-027 222

HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY

As a measure to reduce casualties suffered in automobile accidents, this research attempts to clarify the relation between impact and injury when humans are subjected to impact. Since the major site of injury is the head, determining the relation between impact and injury would provide useful data in formulating automobile safety standards. Research covered the 1976-1978 period and involved experiments on the heads of monkeys. Impact was delivered to the entire head surface through a cranial plaster mask prepared for each subject. Cranial rotational impact and occipital impact were studied. Engineering measurement and medical examination data were obtained. A correlation between impact upon the unrestrained head and the degree of encephalic contusion was determined. Brain contusions were found in 56% of monkey brains subjected to autopsies when brain concussions were evident. Subarachnoid hemorrhaging was virtually absent at the extent clinically evident in desiccated human skulls. Compared with humans, brain concussions of monkeys were slight. Fracture limits were established for human skulls using desiccated human skulls under both static compression and impact tests. A safety limit curve for human skull impact is proposed.

Japan Automobile Inst. Foundation
1979 ; 24p
Sponsored by Japan Ministry of Transport. Translated from Japanese (original 11p; translation 13p).
Availability: Reference copy only

HS-027 223

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979

A multi-vehicle accident occurred on State Route 2, Willowick, Ohio on 6 May 1979. An eastbound 1976 Dodge van crossed the median and collided with a westbound 1971 Ford LTD. The van then proceeded a short distance and collided with a westbound 1976 Oldsmobile. In this collision the van and Oldsmobile were engulfed in flames from gasoline spilled from a ruptured fuel tank. Five of the six occupants in the Ford were killed instantly; the sixth died on 13 May 1979. The van driver was ejected from his vehicle and injured seriously; the two occupants of the Oldsmobile escaped with minor injuries. The National Transportation Safety Board determined that the probable cause of the accident was the loss of control by the driver of the van for unknown reasons. Contributing to the fatal injuries of the occupants of the Ford was their failure to wear the available occupant restraints. It is recommended that median barriers be installed at the scene of the accident and at other locations with an adverse history of across-the-median accidents. It is also recommended that development of fuel tank integrity standards be expedited and that testing be conducted with vehicles in all conceivable impact attitudes.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-7 ; 1979 ; 28p 1ref
Availability: NTIS

HS-027 224

CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT

In an update of earlier reports under the same title, a handbook is provided for use by transportation planners and urban specialists for estimating system parameters for conventional transportation technology. Three modes are evaluated: rail transit, local bus and bus rapid transit, and highway systems. Each mode contains an assessment of seven selected supply parameters: speed, capacity, operating cost, energy consumption, pollutant emissions, capital costs, and accident frequency. These parameters are organized as proxy variables in describing the characteristics of each transport mode. Each mode is discussed in an Appendix section in which these parameters are evaluated in further detail and for particular geographic areas. Two additional Appendix sections contain all references used in the tables/figures, as well as a general bibliography.

by D. B. Sanders; T. A. Reynen
De Leuw, Cather & Co., Washington, D.C.; Urban Inst.; Federal Hwy. Administration
DOT-UT-20019
Rept. No. UMTA-IT-06-0049-79-1; replaces PB-233 580/AS ; 1979 ; 196p refs
Availability: NTIS

HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1

Over 1200 pages are compiled from a conference on innovative energy conversion. The presentations are grouped under the following subject headings: solar collectors; solar ponds; solar thermal systems; solar thermal components; central solar electric technology; terrestrial photovoltaic technology; desiccant cooling; biomass; wind power; flywheel energy storage technology; mechanical energy storage for solar and conventional energy conservation; compressed air energy storage technology; thermal and magnetic energy storage for utility, industrial, and transportation systems; thermal energy storage for building space conditioning; fuel cells; electric vehicle systems; batteries for electric vehicles; batteries for utility storage; hydrogen; coal liquefaction; gasification; fluidized bed processing systems for energy conversion; fluidized bed processing support technology for energy conversion systems; in-situ oil shale and gas technology; in-situ coal technology; geothermal energy; heat engines; Stirling engine analysis; and Stirling engine applications.

American Chemical Society, 1155 16th St., N.W., Washington, D.C. 20036
Rept. No. IEEE-79CH1477-9-ENERGY-Vol-1 ; 1979 ; 1221p refs
Includes HS-027 226--HS-027 250. Vol. 2 is HS-027 251.
Availability: Corporate author

HS-027 226

WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?

An updated account is presented of the achievements of the Programa Nacional do Alcool-ProAlcool (Brazilian National Alcohol Prog.), and of the recently proposed program to extract methanol from wood. The ProAlcool project is an ongoing Federal program established in Nov 1975 to promote increased production of ethanol fuel via fermentation. Addition of 20% anhydrous ethanol by volume to automotive gasoline is now practiced nationwide without vehicle modification, and experiments are being conducted on the substitution of methanol and alcohol for diesel fuel. Investment subsidies are provided by the Brazilian government for expansion and revamping of distillaries and ethanol production, which was nearly 1.5 million cu m in 1977, a 100% increase over 1976. Estimates for the harvest year 1978-1979 indicate ethanol production of 2.5 million cu m, and the 1979-1980 forecast calls for 3.8 million cu m. A program for introducing several 2000 ton/day methanol plants based on gasification of wood (eucalyptus) has been proposed by CESP-Sao Paulo State Energy Utility. Methanol could potentially be recovered as a byproduct in the production of charcoal for blast furnaces. The production, utilization, and process considerations of ethanol and methanol are discussed. Despite high capital investments and higher initial costs, alcohol fuels show promise for oil-scarce countries such as Brazil, which have abundant land, water, and sunshine. New energy sources are needed to help reduce Brazil's heavy dependency on oil (42% of current energy demand) of which 82% is imported, resulting in a severe trade deficit. Important social benefits from increased alcohol production include creation of jobs in rural areas, improved income distribution, and a more balanced development of the country.

by A. V. Carvalho, Jr.; V. Yang; S. C. Trindade
Centro de Tecnologia Promon-CTP, 22210 Rio de Janeiro, Brazil
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p295-300
Rept. No. ACS-799065 ; 1979 ; 13refs
Conference held in Boston, 5-10 Aug 1979.
Availability: In HS-027 225

HS-027 227

IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL

A series of quantitative utility factors is developed to demonstrate that the use of alcohol can improve the octane rating of unleaded gasoline and reduce the need for the U.S. to import more oil. The addition of ethanol to gasoline (to make gasohol) improves the octane rating by two to four points. Comparative calculations show that one BTU of ethanol octane-boosting additive replaces 3.6 BTU'S of petroleum and that 6% more crude oil is required to produce high octane unleaded gasoline than regular gasoline. Although ethanol has 2/3 of the BTU value of
gasoline, gasohol offers a 5.3% to 6.1% improvement in fu
economy. Claims that ethanol production requires two BTU's o
energy input for each BTU of output are shown to be limited t
analyses of the production stage, not of end use of the ethano
produced. These claims also fail to consider the use of nonpetro
leum inputs during methanol production. In all probability, us
of a 10% ethanol/gasoline mixture will save at least two units o
petroleum or gas energy for each unit that it replaces.

by Pincas Jawetz
Independent Consultant on Energy Policy, 425 E. 72nd St., New York, N.Y. 10021
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p301-2
Rept. No. ACS-799066 ; 1979 ; 7refs
Conference held in Boston, 5-10 Aug 1979.
Availability: In HS-027 225

HS-027 228

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES

Simple, algebraic equations are used to relate vehicle mass (WT
and energy consumption (C) to parameters describing electri
and hydrogen (H2)-fueled vehicles. By differentiation, the sens
tivity of WT and C to component improvements is determine
and used to formulate a rational research and development (
and D) investment policy. For H2-fueled and electric vehicle
R and D investment in improving vehicle energy-storage d
vices is predicted to produce greater decreases in WT and
than investment in the powertrain. Using a published forecast
component characteristics, WT and C for both kinds of vehicl
are projected into future time frames. Between 1985 and 1990
range of 150 km is projected, increasing by the mid- 1990's
250 km. The results show that the lead-acid battery, possessi
the most optimistic characteristics forecast, does not result in
practical electrical vehicle (EV) for any of the missions (Com
muter Car Cycle and Scott Cycle for both ranges), nor does th
nickel/iron battery for the 250 km Scott Cycle mission. Gene
ally, the EV'S exhibit greater WT/WPL (energy-storage-devic
mass) than the metallic hydride vehicles, but the higher energ
efficiency of EV's can result in relatively lower values of C
WPL. Appended is an analysis of the beneficial impact of fl
wheel transmissions on vehicle WT and C.

by Robert F. McAlevy, 3rd.
Robert F. McAlevy 3rd. and Associates
UC-LLL-P.O.-1858109; UC-LLL-P.O.-2122409
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p337-42
Rept. No. ACS-799076 ; 1979 ; 8refs
Conference held in Boston, 5-10 Aug 1979.
Availability: In HS-027 225

HS-027 229

REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM

The current status is described of a program to develop a
evaluate a regenerative flywheel energy storage system for
battery/flywheel electric vehicle (EV) in the 3000 lb cla
Planned laboratory tests will simulate this EV operation ov
the SAE J227a Schedule D driving cycle. The range improv
ment attributed to the flywheel will be established; it is proje

ed to be from 40% to 50% greater than that of an all-battery vehicle when used in a repetitive, start-stop driving cycle. The flywheel energy storage system will consist of a solid rotor, synchronous inductor-type flywheel drive machine electrically coupled to a DC battery electric propulsion system through a load commutated inverter. The motor/alternator unit is coupled mechanically to a small, steel flywheel which provides a portion of the vehicle's accelerating energy and regenerates the vehicle's braking energy. The laboratory simulation of the EV propulsion system will include a 108 volt lead-acid battery bank, a separately excited DC propulsion motor coupled to a flywheel which simulates the vehicle's inertia, and the flywheel energy storage system comprised of the motor/flywheel unit, the load commutated inverter, and its control.

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UC-LLL-8990503; Ref: DOE-EY-76-C-02-4010
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HS-027 230

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE

The conceptual design of an automotive propulsion, thermal energy storage (TES) system has been developed that utilizes the sensible and latent heat of fusion of a molten fluoride salt. Electromechanically pumped potassium serves in the vapor-liquid heat transport system, and high-performance nonmetallic insulation is utilized to minimize energy loss. A vehicle range of over 160 km (100 mi) can be achieved with a 500-kg system, and peak power rates in excess of 200 KW can be delivered. Life cycle costs of the TES system with electrical energy recharge are projected to be 10.6 to 11.1 cents/mi; costs of 9.9 to 10.5 cents/mi might be possible with natural gas recharge. Recharge time constraints for either natural gas or electric recharge will probably prevent TES system vehicles from replacing conventional internal combustion engine vehicles. Psychological effects related to the safety of molten salt TES systems (possibility of fire during accidental potassium release) and necessary institutional changes in crash control and removal procedures may present significant barriers to public acceptance. It is suggested that 1/2 or 2/3 scale (50 to 66 kWh) version of the present system be selected for demonstration.

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HS-027 231

THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES

The second-year effort to assess the state of the art of in-use electric and hybrid vehicles (EHV's) is summarized. Included are the results of extensive contacts with, or site visits to, users and manufacturers of these vehicles, as well as battery and component manufacturers and administering agencies in the U.S., England, Germany, France, and Japan. The only long-term, cost-effective fleet operation of EV's (electric vehicle) worldwide is the milk delivery system in England. Japan is the only country with hybrid vehicles in daily commercial use. The EV in the U.S. has captured the interest and involvement of the major battery manufacturers and component suppliers, but has found only marginal interest from the major automobile and truck manufacturers. Major automakers outside the U.S. have shown a more active interest in the EV. The only large-scale EV fleet in the U.S., that of the Postal Service, continues to operate satisfactorily. The light-duty truck (delivery van) in fleet operations and specific duty cycles is the most common EV application. Fleet operation appears to be the most appropriate means for introducing this new vehicle technology. Successful introduction and effective utilization of EV's require a mature infrastructure: electric power generation, transmission, and distribution systems; charging or battery transfer facilities; maintenance facilities; vehicle dealer networks; replacement parts; vehicle maintenance and repair procedure documentation. Modular design, failure warning, and back-up systems can do much to permit "limp-home" operation. Purpose-designing offers the highest probability of successful EV performance. Limited performance capabilities and high cost are the major barriers to sizable market penetration.

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HS-027 232

CURRENT DEVELOPMENT ACTIVITIES ON ELECTRIC VEHICLES IN EUROPE

European research and development (R and D) activities concerning electric vehicles (EV's) are reviewed country by country. England is the only country in Europe with a living tradition in EV's, i.e. the "milk float" of about 50,000 vehicles which distribute dairy products in urban areas. The Electric Vehicle Devel. Group of England was formed in 1978 to promote the establishment of a diverse electric road transport system. The Energy Res. Group of the Open Univ. Milton Keynes is presently studying the systems effects associated with widespread use of EV's. National Carriers Ltd., in a consortium with Chrysler (U.K.) Ltd. and Chloride Technical Ltd., introduced the Silent Karrier electric delivery vehicle in 1976. The British government supported its battery technology, and the Greater London Council is sponsoring a large-scale, three-year trial of the Silent Karrier and vehicles designed by Lucas and Crompton Parkinson. Joseph Lucas Ltd. is conducting a program to develop lightweight traction batteries as well as complete electrical drive systems. The company has put into service Post Office vehicles, a Pullman Personnel Carrier, a Midi bus, and a taxi cab. In the Federal Republic of Germany, most of the money invested since 1974 by government and private sources for electric and hybrid vehicle R and D has been used to develop delivery vans and buses by a consortium of Volkswagen, Daimler Benz, MAN, Bosch, Siemens, and Varta. In 1975, GIVE (Electric Vehicles Interministerial Com.) was created in France to initiate the development of electric commercial vehicles. ENEL, the Italian National Electric Board, has in recent years launched an extensive R and D, and demonstration program for EV's. In Belgium, the Free Univ. of Brussels is conducting EV battery studies. Eindhooven Univ. of Technology (Holland) is studying lead-acid batteries and is working on an electric car project. Switzerland offers a four-seater electric road vehicle, the Carville (Electrona Ltd.). In Sweden, main efforts have been in nickel-iron and nickel-zinc battery development. SAAB has made several prototype EV's and a new company, SETU, was established to develop large-fleet EV's.

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Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p596-601
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HS-027 233

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE

To decrease the amount of gasoline consumed by automobiles, a gasoline-electric hybrid vehicle has been designed which uses electrical energy for city driving and gasoline for highway cruising or for city driving after the batteries have been discharged. To minimize energy consumption while retaining performance equal to or better than that of current gasoline vehicles, the car is propelled by energy stored in the flywheel. Energy can be put back into the flywheel by regenerative braking. The electric motor controls are extremely simple since the motor is only used to accelerate the flywheel at full current or when it is shut off. The internal combustion engine may also be used to charge the flywheel, but it is never used to recharge the batteries as it is much more efficient to put all of its energy into the flywheel. The batteries, electric motor, and flywheel are built into one discrete unit. Since these components are not needed for highway cruise, this unit can be removed to lighten the vehicle and provide room for luggage. This vehicle was designed for near-term production, emphasizing simplicity. Any future improvements in battery technology will increase the appeal of this concept.

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Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-VOL-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p607-12
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HS-027 234

APPLICATIONS OF FUEL CELLS IN TRANSPORTATION

Technical and economic evaluations of the potential use of fuel cells to power four vehicle types are summarized: city bus, highway bus, delivery van, and consumer car. The phosphoric acid fuel cell was used as the baseline (fuel cell and reformer data supplied by Energy Res. Corp.). Two cell sizes (15 kW and 60 kW) and two fuel options (methanol and propane) were utilized. The results of analysis of the four target vehicles strongly suggest the feasibility of the fuel cell vehicle in the 1990's. No fuel cell, battery, motor, or vehicle aerodynamic performance improvements were projected in making this assessment. Technical feasibility was demonstrated in each vehicle. Economic viability was more difficult to prove because of the scarcity of uniform vehicular performance, duty cycle, and economic data, and the lack of experience with fuel cells in the vehicular environment. Since conservative rather than optimistic estimates were used in the analysis, prediction of first-order economic viability in the 1990's seems justified.

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HS-027 235

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES

Batteries for electric vehicle (EV) propulsion can be develope to effect tradeoffs between short-term peak power capabilit and energy storage capacity. Such batteries in combination wit a mechanical energy storage device can optimize both EV power and range capability. Equations are derived for determining the vehicle mass fraction of the mechanical energy storag system that is required to achieve a vehicle mass saving o increase in range. The extent to which mechanical energy storage systems can improve EV performance depends upon th battery type and the vehicle power/mass requirements.

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HS-027 236

ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE

A one-year program is described involving the design, fabrication, and experimental determination of the performance of an advanced, hermetically-sealed energy storage unit (ESU) that has been sized for a typical 3000-lb curb weight vehicle. The program is designed to provide decision-making information regarding the benefits of a mechanical energy storage device as it applies to vehicle fuel consumption or range. The benefits must be great enough to reduce the life-cycle cost of the flywheel propulsion system below that of a conventional propulsion system. The total weight of the ESU is 80 lb, corresponding to a total specific energy of 3.16 w-hr/lb and a specific power of 569 w/lb. The ESU design utilizes a dual-pressure chamber concept wherein a composite material flywheel rotates within a cavity under about 1 micron pressure during operation while the remainder of the unit is pressurized to 2 torr. This pressure differential is provided by a molecular pump. When the unit is at rest, the internal pressure in both cavities equalizes at approximately 1 torr. The transfer of energy in and out of the unit is accomplished by an electrical induction machine coupled directly to the flywheel. The maximum power transfer is 45 kw, which is available at all operating speeds between 21,000 and 42,000 rpm. The slip control method used to modulate the power is based on comparing electrical machine speed, inverter frequency, and commanded power. Three main categories of tests in the ESU development program are performance (spin-down losses), proof of design, and environmental.

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Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p622-6
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HS-027 237

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES

Ongoing research is described in the development of an advanced electric vehicle induction motor drive system consisting of a three phase inverter and an induction motor. Since this drive is operated in a controlled slip mode (variable frequency, variable voltage) it is capable of supplying breakdown torque at stall without having to sacrifice low slip characteristics at normal operation. As the machine is operated at low slip over the entire speed range, a major improvement in efficiency is realized. Regenerative braking is also easily obtained by changing the sign of the slip. Despite the increased controller complexity, a significant potential exists for the induction machine/controller combination to result in an overall lower cost system compared to DC systems. This combination offers maintenance-free operation. Inasmuch as the trend of rapid reduction in power semiconductor costs is expected to continue, additional widening of the potential advantage of the induction/controller approach is expected.

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HS-027 238

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION

The Power Wheel, which is uniquely configured with a combination of axially aligned magnetic pole pieces, is described. It is designed to minimize the frictional losses normally encountered with moving parts such as bearings, gears, and sliding surfaces, and to recover through the regeneration process some of the kinetic energy usually dissipated in stopping a vehicle by frictional braking. The magnetic gaps lie in two parallel planes perpendicular to the rotation axis. The 12 stationary electromagnet poles used in the 15-in wheel hub design for the automobile are wound on high-permeability, silicon C-cores which are mounted back to back on radial support arms of nonmagnetic stainless steel. Magnetic flux paths are split into two balanced fields which interact with corresponding pairs of permanent magnets. Cogging or stepping is virtually undetectable because the brushless commutation scheme produces 132 distinct switching intervals for each revolution of the wheel. Variable-speed operation of the wheel hub motor is accomplished using a cycloinverter. The high-frequency component of the cycloinverter waveform is generated by an inverter external to the wheel. This fundamental, low-frequency component is derived from the output of Hall-effect devices and produces the synchronous torque. Rotational torque is achieved by directing current through each of six pairs of independently controlled electromagnet poles in order to produce a magnetic field that attracts the closest approaching permanent magnets and repels the departing adjacent permanent magnets. A promising application of the power wheel concept is the Sky Shuttle, an urban mass transit vehicle capable of carrying 160 passengers along a set of bridge-like, catenary-supported cables. Duluth, Minn. may be the first city to establish a pilot stretch of second-generation Sky Shuttle trains.

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HS-027 239

AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH

An electric vehicle drive concept is described which uses a separately excited DC motor controlled only by a transistor field control, a centrifugal clutch, and a transmission with a choice of three gear ratios, thus offering automatic driving behavior and high efficiency. Performance data (hill climbing ability, maximum speed, acceleration) are derived from motor and clutch characteristics of a Volkswagen (VW) Electric Pick Up equipped with the drive system, and are compared with test results. Dynamic driving behavior of the test vehicle is diagrammed and discussed. With a maximum speed of 77 kph and a hill climbing ability of 22% at 12 kph, the prototype test vehicle meets or exceeds the performance of a VW Van with fully electronic control except for acceleration, which is 21 seconds from 0 to 50 kph. The VW Van with fully electronic control has a maximum speed of 70 kph, a hill climbing ability of 14%, and acceleration from 0 to 50 kph in 13 seconds. A problem with the new drive system is clutch judder, which sometimes occurs during the slip mode operation of the centrifugal plate clutch.

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HS-027 240

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW

Funding levels, performance goals, and battery systems under development are described for the Dept. of Energy's (DOE) electric vehicle (EV) battery program which includes near-term battery development and advanced battery research and development. The near-term segment was established to support the EV demonstrations mandated by the Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976 (EHV Act). For EHV Act vehicles, the improved battery technology will be available no later than 1984. This near-term battery program involves the development and engineering design of three types of full-size vehicle batteries (20 to 30 kWh): nickel/zinc, nickel/iron, and improved lead-acid. The advanced battery technology, involving more energetic electrochemical systems and higher performance goals, is expected to be available for vehicles built in the late 1980's and beyond. These advanced batteries should enable EV manufacturers to produce vehicles capable of 150 mi range or more, with acceleration and cruise speeds virtually equal to heat engine vehicles. Four types of advanced batteries receiving DOE support are lithium/metal sulfide, sodium/sulfur, zinc/chlorine, and metal/air (e.g. iron/air, aluminum/air). Support for EV batteries is also provided through other elements of DOE's broadly based Electrochemical Systems program. This includes research on fundamental electrochemical problems of selected EV battery couples, development of improved cell components and battery system components, studies relating to battery/vehicle integration and battery environmental and safety issues, and exploratory investigation of new EV battery candidates.

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"Intersociety Energy Conversion Engineering Conference
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HS-027 241

A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION

The characteristics and properties of four metal-air battery systems being considered for future use in commuter electric vehicles (EV's) are briefly described, and a comparison is made of their expected performance, use conditions and operating costs. The anode materials are lithium (Li), aluminum (Al), zinc (Zn), and iron (Fe). For an Al-air (mechanically rechargeable) system now being developed, projected performance for specific energy content (and hence range) is superior to that projected for either Zn-air or Fe-air. An Fe-air secondary battery equipped with a bifunctional air electrode is expected to have peak power comparable to that of the Al-air system. The tradeoff for these two systems occurs between the more extended range for Al-air and the lower cost (ownership and operation) and ease of recharging (maintenance) for Fe-air. An imaginative design approach has allowed demonstration of a slurry Zn-air system which avoids the problems usually associated with the Zn plate electrode, but projected performance and cost estimates for this system indicate its inferiority to Fe-air and Al-air. While Li-air is in a very early development stage, Fe-air secondary batteries have already been used in commuter EV's.

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HS-027 242

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT

A series of charges and discharges were performed at widely varying currents and over a range of temperatures on large groups of lead-acid batteries as part of a program to improve the state of the art of the electric vehicle battery. Thirty-two design variables involving 96 batteries were studied. Discharges were performed at constant current values of 10, 40, 60, 80, 150, and 250 amperes, at 25 degrees C, 40 degrees C, and 0 degrees C. The thermal and electrical performances of individual plate groups, individual cells, and complete batteries were recorded on magnetic tape. These data were subsequently reduced to graphic and tabular form for analysis. The design of the test equipment, its operational modes, and typical data output is discussed in terms of both battery and computer technology. Design and construction data (e.g. active material weights, component composition, battery specific gravity, battery weight) were also computerized. A preliminary analysis of the test data indicated that the techniques are adequate to handle the complexities of large-scale testing of the numerous different designs of lead-acid batteries normally tested as part of a major design and development program. The use of separate microprocessors for control and recording coupled with immediate data storage on magnetic tape reduces the probability of losing irretrievable data. The use of redundant components usually limits failures, provides interchangeability of parts, reduces maintenance of spare components, and speeds isolation and repair of malfunctions.

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HS-027 243

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES

The battery cells currently under development by Argonne National Lab.'s Lithium/Metal Sulfide Battery Prog. consist of Li-Al (lithium-aluminum) negative electrodes, FeS (iron sulfide) positive electrodes, a separator to provide electrical isolation of the electrodes, and molten lithium chloride-potassium chloride electrolyte. Most cells fabricated until recently have been of a prismatic, bicell design with a central positive electrode and two facing negative electrodes. Three types of separators have been used: BN fabric (Carborundum Corp.) with ceramic cloth (usually Zr02 (zirconium oxide)), BN felt, and Mg0 (magnesium oxide) powder. To achieve Mark II Battery performance goals modeling studies using the bicell design have indicated the need to develop and characterize the multiplate cell. A baseline multiplate cell having three positive electrodes, and four facing negative electrodes has recently been developed for evaluating alternative electrode separators. The assembly and operation of two of these multiplate cells and a number of bicells indicate that both BN felt and Mg0 powder show potential as suitable separators and substitutes for the more costly BN-Zr02 fabric combination. The performance of a bicell containing BN felt was improved by the use of a multiplate configuration. The multiplate cell achieved a 13% improvement in specific energy and a 50% improvement in specific power. A multiplate cell with Mg0-powder separator indicates similar performance improvement.

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HS-027 244

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY

A proof-of-concept charging system for Li-Al/FeS (lithium-aluminum/iron sulfide) electric vehicle batteries of up to six cells have been built as part of Argonne National Lab.'s Lithium/Metal Sulfide Battery Prog. The system employs a unique current-controlled operating scheme by which the charge current is automatically adjusted throughout the charge cycle to ensure that the terminal voltage of each series-connected cell in the battery system remains at or below a predetermined safe limit level. The charger/equalizer system consists of three basic parts: the main charger, the individual cell monitor/shunt (M/S) electronic circuit modules, and the system control unit. Tests have been performed on both Li-Al/FeS and lead-acid batteries. Accurate and reliable operation has been achieved at various bulk and equalization charging rates and over a wide range of cell voltage limit levels. A 40-cell charger/equalizer system is to be fabricated for testing with a 48-V, 26-kWh, Li-Al/FeS battery. The charger/equalizer system may offer the following advantages to other battery system types: reduced gas generation, reduced water consumption, cleaner battery containers, reduced maintenance, and increased battery life. Cost-effective charging systems for lithium/metal sulfide batteries are expected when manufacturing volumes justify single integrated circuit packaging of the cell M/S modules.

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HS-027 245

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY

A MULTI-FOIL insulation container has been developed for a 20-kWh lithium-aluminum/metal sulfide battery which has an operating temperature around 450 degrees C. In order to provide the maximum usable space in an electric vehicle, a rectangular configuration was selected. The enclosure consists of two nested corrugated boxes built of 0.031-in thick Inconel 718 (an age-hardening nickel-based alloy), with interior dimensions of 15.72 in x 9.80 in x 58 in and exterior dimensions of 18.77 in x 12.85 in x 60 in. The mass of the vacuum enclosure is 70 kg. The measured heat losses through the Prototype I insulation container are 100 W at 400 degrees C and 160 W at 475 degrees C. These excessive losses, almost twice the calculated values, seem to be the result of the tight compression of the MULTI-FOIL insulation at the rear walls of the enclosures, due to deflection of the rear panels of inner and outer boxes when the foil compartment was evacuated. If the design constraints are not significantly relaxed, the cost of a rectangular container for vacuum foil insulation is unlikely to be commercially viable unless an insulation can be developed that is load-bearing and that has an acceptable heat loss. The present nonload-bearing insulation will probably be economical only if it is used in a cylindrical container.

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HS-027 246

MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES

The fundamental operation of the zinc chloride battery system is explained, and information is provided on the first commercial battery of this type for electric vehicle (EV) propulsion (components, design points, energy flow diagram, projected selling price). A safety study for the chlorine hydrate battery for EV applications is cited. The only potential safety hazard is chlorine release. Equations are used to describe the sensitivity of battery weight and battery volume to delivered energy and sustained power. Using the battery equations and data on the required weight of the vehicle mechanical structure, battery/electric van combinations matched to a desired payload (1/2-ton, 3/4-ton, and 1-ton) and vehicle mission (50 mi, 100 mi, and 150 mi on the SAE J227a(D) cycle) are presented for a selected vehicle design. The approximate selling price of the batteries is tabulated for various payload and range combinations.

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HS-027 247

CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES

The construction, filling procedure, pressurization, and safety aspects are outlined for two fuel tanks for liquid hydrogen (LH2) which were specially developed for automobile applications. A stainless steel tank has a capacity of 120 liters; an aluminum tank can hold 150 liters of LH2. The design and operation of a semiautomatic "filling station" for LH2 are described. The refueling unit was designed and constructed to show how LH2-fueled vehicles can be refueled simply and safely by untrained persons. The unit has two lines, one for LH2 and the other for gaseous ventilation from the car fuel tank. Pressurized LH2 (about 2 bar) coming from a main storage vessel passes down the fill line through a cryogenic solenoid valve (CSV) and a one-way valve, into the vehicle tank. Gaseous hydrogen ventilation takes place by the vent line, passing a one-way valve, a CSV, and back to the recovery system. The filling procedure requires only the pressing of two buttons and three manual steps: connection of the twin-hose plug and the tank valves, opening of the tank valves, and closing of the tank valves and removal of the twin hoses. A refueling time of 5 minutes for a 120 liter tank has been demonstrated for this "self-service gas station".

by W. Peschka; C. Carpetis
Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt e. V., Institut fur Technische Physik, 7000 Stuttgart 80, Federal Republic of Germany
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p763-7
Rept. No. ACS-799160 ; 1979 ; 3refs
Conference held in Boston, 5-10 Aug 1979.
Availability: In HS-027 225

HS-027 248

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS

A technology-oriented survey is reported of several recent and ongoing development and demonstration projects involving liquid hydrogen (LH2) containers for fuel-system service in highway transportation. Projects are covered by the following research and development organizations in the U.S. and overseas: Beech Aircraft Corp. (Boulder, Colo.); Minnesota Valley Engineering, MVE Cryogenics (New Prague, Minn.); Musashi Inst. of Tech. (Tokyo, Japan); and Deutsche Forschungs- und
Versuchsanstalt fur Luft- und Raumfahrt e.V., DFVLR (Stut
gart, Federal Republic of Germany). Estimated containe
system production cost information was provided by sever
cryogenic vessel manufacturers in the U.S. A unique, sem
automatic LH2 "service station" developed in Germany is d
scribed (see also HS-027 247). A general assessment is given
the state of technology of vehicle hydrogen containers an
associated systems, including the identification of importa
"pacing items" deserving initial attention in prospective researc
and development activities. It is concluded that compared
other available options for hydrogen storage in highway veh
cles, the cryogenic liquid approach may stand alone in feasib
ity. Although not presently being actively pursued in the U.S
as are metal hydrides, the LH2 approach can probably
viewed as the "standard of comparison" among the alternative

by William J. D. Escher; E. Eugene Ecklund
Escher (Foster) Technology Associates, St. Johns, Mich.; Dep
of Energy, Alternative Fuels Branch, Washington, D.C. 20585
ERDA-P.O.-EC-77-X-01-2752
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p790-5
Rept. No. ACS-799164 ; 1979 ; 5refs
Conference held in Boston, 5-10 Aug 1979.
Availability: In HS-027 225

HS-027 249

CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS

Technology levels and potential applications of free-piston St
ling engines (FPSE) being developed by Mechanical Techn
ogy's Stirling Engine Prog. are discussed. Three advanc
engine configurations are presently in the hardware phase
development. Concurrent linear generator development wo
has resulted in substantial improvement in the efficiency a
power output of these machines. A dedicated technical effort
being directed to achieve performance and reliability required
make the FPSE a major competitor with internal combusti
engines. Four development programs are aimed at establishing
family of power systems covering a market size from 1 KWe
15 KWe: 1 KWe fossil-fueled stationary electric generator,
KWe fossil-fueled heat pump, 5 KWe fossil-fueled hybrid el
tric vehicle propulsion system, and 15 KWe advanced so
engine generator. Application of the FPSE to smaller pow
sizes for cryogenic cooler applications has also been address
Combined with gas bearing technology, a hermetic system
high efficiency and long life can be an attractive alternative
present cooler configurations. It is believed that the FPSE
provide significant economic savings as well as multi-fuel ut
zation, low noise and low emissions. The prime applicat
areas for this engine are electric power generation for station
and hybrid propulsion systems, and residential and light co
mercial heat pump markets.

by B. S. Goldwater
Mechanical Technology Inc., Stirling Engine Systems, 968 Albany-Shaker Rd., Latham, N.Y. 12110
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1), "Intersociety Energy Conversion Engineering Conference (14th) Proceedings. Vol. 1," Washington, D.C., 1979 p1142-5
Rept. No. ACS-799246 ; 1979 ; 6refs
Conference held in Boston, 5-10 Aug 1979. Research sponsor
in part by Dept. of Energy.
Availability: In HS-027 225

HS-027 250

A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION

A Total Energy System (TES) has been developed for recreational vehicle (RV) applications where the unique features of a new Stirling cycle engine enhance user comfort, convenience, and safety. Two companies, Thetford Corp. (U.S. company involved in recreation industry) and FFV (Swedish industrial group which developed a commercial Stirling engine), developed the TES in 1970, merging in 1977 to form Stirling Power Systems Corp. (SPS). Prior to TES development, functional components for heating, air conditioning, cooking, and refrigeration were available for RV's but not as an integrated system. The integration of components, including the FFV Stirling Engine or Stirling Power Pack (SPP), was accomplished in cooperation with Winnebago Industries, a leading motor home manufacturer. The TES is quieter, more efficient, safer, and less polluting because of its unique design and use of the Stirling powerplant. It is composed of a number of convenient modules: SPP, roof unit, heating system, electrical control center, battery charger/inverter, and control panel.

by Lennart Johansson; William B. Lampert
Stirling Power Systems Corp., Ann Arbor, Mich.
Publ: HS-027 225 (IEEE-79CH1477-9-ENERGY-Vol-1),
"Intersociety Energy Conversion Engineering Conference
(14th) Proceedings. Vol. 1," Washington, D.C., 1979 p1162-8
Rept. No. ACS-799250 ; 1979 ; 2refs
Conference held in Boston, 5-10 Aug 1979.
Availability: In HS-027 225

HS-027 251

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2

Papers on innovative energy conversion are presented, covering the following topics: space power systems, requirements and plans; photovoltaic space power systems; space photovoltaics and solar arrays; space power batteries; aircraft power systems; spacecraft power electronics; aerospace power thermal control; space nuclear reactor/isotope power systems; megawatt solar power systems; nuclear loss-of-fluid test (LOFT); nuclear fusion; industrial energy conservation; energy conservation in utilities; heat pumps; energy conservation in communities; thermodynamic analysis; energy policy and planning; thermoelectrics; thermoionics; magnetohydrodynamics (MHD); advanced concepts; and energy conversion problems in Japan. Late papers are grouped at the end. Abstracts are presented for papers from 1976 through 1979 in ascending numerical order (report numbers); subject and author indexes are provided.

American Chemical Society, 1155 16th St., N.W., Washington, D.C. 20036
Rept. No. IEEE-79CH1477-9-ENERGY-Vol-2 ; 1979 ; 1179p refs
Vol. 1, (IEEE-79CH1477-9-ENERGY-Vol-1), is HS-027 225.
Availability: Corporate author

HS-027 252

NITROSAMINES IN NEW AUTOMOBILES

Thirty-eight 1979 model year automobiles were tested in the Boston, Mass., area to evaluate interior levels of airborne nitrosamine pollutants. Gas chromatographic analysis was carried out using an isothermal gas chromatograph (Thermo Electro Model 661) interfaced to a TEA analyzer (Thermo Electro Model 502LC). Except for one vehicle, all automobiles were new and were tested at car dealerships. Volatile nitrosamines, including N-nitrosodimethylamine (NDMA), N-nitrosomorpholine (NMOR), N-nitrosodiethylamine (NDEA), and possibly N-nitrosodibutylamine (NDBA), were present as airborne pollutants. Levels ranged from 0.07-0.83 micrograms per cubic meter for NDMA, 0.07-2.5 for NMOR, 0.04-0.39 for NDEA, and trace levels for NDBA. With the engine running, nitrosamine levels on a two-hour sample taken in the rear seat were reduced fivefold to tenfold, compared with the engine being off. This implies that, for late model cars, human exposure to nitrosamines is probably limited to the first few minutes of each trip. Nitrosamine exposure to humans in new cars is similar to that from beer and bacon.

by D. P. Rounbehler; J. Reisch; D. H. Fine
New England Inst. for Life Sciences, 125 Second Ave.,
Waltham, Mass. 02154
NSF-ENV75-20802
1979 ; 18p 16refs
Submitted for publication Aug 1979.
Availability: Reference copy only

HS-027 253

OPERATION C.A.R.E. (COMBINED ACCIDENT REDUCTION EFFORT)

Operation CARE (combined accident reduction effort) was initiated during the 1977 Memorial Day weekend as a coordinated effort by State law enforcement agencies to assure compliance with the 55-mph speed limit, prevent traffic fatalities, reduce automobile accidents, and lessen personal injuries. In preplanning sessions for the holiday, two State police sergeants from Indiana and Michigan determined that speed limit visibility and enforcement should be consistent as motorists left one State and entered another. Thirty-six States participated in a 1978 meeting to lay plans for a national cooperative effort. Operation CARE has the primary goal of accident prevention during the Memorial Day, Independence Day, and Labor Day holiday weekends. A unique feature of the program is State management. The Federal Government does not mandate or control the program. The Department of Transportation estimates that enforcement of the 55-mph speed limit over the next 10 years can save 31,900 lives, forestall 414,000 injurious accidents, and save 30 billion gallons of gasoline.

by Marv Smalley
Indiana State Police, Field Operations Section
Publ: FBI Law Enforcement Bulletin v48 n10 p2-4 (Oct 1979)
1979
At head of title: Traffic
Availability: See publication

HS-027 254

A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS

A description and summary are presented of Federal transportation policies and programs as enunciated by the executive, congressionl, and judicial branches. The purpose of the report is to provide a basic framework of status quo Federal transportation guidelines and actions, so that proposed changes can be analyzed within the context of this existing framework. A narrative description is given of the sources of Federal policies and programs for the intercity, urban, rural and international markets, with attention to the gaps and conflicts in these policies and programs. It is concluded that, instead of a unified national transportation policy, the U.S. has an assortment of policies and programs which have been developed in an ad hoc fashion. These are marked by inconsistencies, exemptions, and overlapping and conflicting jurisdictions. In addition, many non-transportation policies have a serious impact on the transportation sector, but these potential effects are often not considered in advance of adoption. It is also concluded that the Federal government has no accurate calculation of of its expenditures for transportation or of the aid provided by other levels of government to transportation, and that it has limited data on the physical performance of the U.S. transportation system. Appended are lists of the 30 congressional committees and the 64 Federal agencies with transportation responsibility, and detailed descriptions of approximately 1,000 transportation policies and programs.

National Transportation Policy Study Commission, 2000 M St., N.W., Suite 3000, Washington, D.C. 20036
Rept. No. NTPSC/SR-79-06; PB-294 454 ; 1979 ; 421p refs
Availability: NTIS

HS-027 255

EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE

Emission testing was conducted on 11 demand-responsive vehicles (i.e. vans and small buses) used in transportation service designed to attract people away from automobile use and to mass transit for commuting and shopping. Each vehicle was tested using the Federal Test Procedure (FTP) for Light-Duty Vehicles; the Surveillance Driving Sequence, including steady-state modes; and the AA (Ann-Arbor)-1 Urban Bus Cycle, developed by EPA (Environmental Protection Agency). Each vehicle was run at typical inertia loads for all test procedures and fully loaded for the AA-1 cycle. All FTP tests were cold-start; all others were hot-start. Average FTP emissions of hydrocarbons were four times higher than comparable light-duty standards; average carbon monoxide emissions were six times higher, and nitrogen oxides emissions about three times higher. Modal emissions using the composite bag and calculated method agreed well for each of the pollutants. As expected, AA-1 low vs. high inertia weight emissions were less for each pollutant, and fuel economy for the low weight was better. The cold, transient portion of the FTP compared to AA-1 was considerably higher in emissions due to the cold-start effect, but the cold-stabilized portion of the FTP was much closer to the AA-1. (The driving cycle average speeds of both tests are nearly equal and both tests are essentially hot starts.) The data will be used by EPA to estimate emission inventories for demand-responsive vehicles.

by John A. Gunderson
Olson Labs., Inc., 421 East Cerritos Ave., Anaheim, Calif. 92805
EPA-68-03-2411-T.O.-3
Rept. No. EPA-460/3-78-004; PB-292 486 ; 1978 ; 152p 5refs
Availability: NTIS

HS-027 256

MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE

John Miles, a Grand Prix driver with Lotus in 1969 and 1970, and now a member of the Autocar test and technical team, offers advice on how to improve one's driving skills. As an
introduction, a guide is provided of items to consider for be
driving. These include regular checkup of the car; cor
driver position to reduce stress, maintain good control,
provide best sensory input; familiarity with the car; concen
tion; smooth driving for maximum fuel economy; careful ro
way positioning; and proper response to highway traffic,
verse weather, broken windows and tire and brake failures.
second section describes and illustrates some potential accid
situations, illustrating the need to be aware of dangers and
know how to take evasive action. Information is given on
vanced driving training, including advanced driving tests adm
istered by the Inst. of Advanced Motorists (IAM) and
League of Safe Drivers (both in London, England), and
vanced driving courses offered by the British School of Mo
ing and by a driving coach, Mike Franey (both located
London). A description is given of the IAM driving test
Tony Howard who has taken the exam. Information is given
skid control schools; a list of skid pan facilities in Englan
provided. Final sections discuss racing driver's schools, incl
ing the disadvantages and advantages of several British scho
and describe the race car driver's technique, to provide ins
for the racing spectator and useful lessons for the every
motorist.

by John Miles; Tony Howard
Publ: Autocar Spec. Report v151 n4323 p1, 3-18 (15 Sep 197
1979
Availability: See publication

HS-027 257

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING

Stuart Bladon, an acknowledged expert on economy driv
and a reporter on fuel-saving techniques and events, provid
guide to money-saving driving. Based on his many years
competition in fuel economy contests, Mr. Bladon offers adv
on anticipation and concentration in driving, throttle con
and use of gears, freewheeling, coping with a cold engine,
avoiding unnecessary loss of fuel. A checklist is provided
maintenance practices for better fuel economy which covers
ignition, carburetion, fuel system, wheels and tires, brakes,
general items. A fuel-saving device, British patent applica
no. 7919370 by Ian Harris, is described which prevents
being drawn into the engine when the driver's foot is off
accelerator. Autocar test results show a fuel savings of 4%-
with the device. The merits of overdrive for better fuel ec
my are discussed by Michael Scarlett. The sponsorship by
ious oil companies and organization of fuel economy runs by
Hants. and Berks. Motor Club (England) are discussed. A
car's Road Test figures on passenger car fuel economy
presented as a safe basis for comparison of the fuel economy
average motorist might expect from his car. The British "
system for grading (octane rating) fuel at the pump is discu
A final section, by Jeffrey Daniels, examines the diesel car
the intent of improving its image.

by Stuart Bladon; Michael Scarlett; Jeffrey Daniels
Publ: Autocar Spec. Suppl. v151 n4324 p1, 3-18 (22 Sep 197
1979
Availability: See publication

HS-027 258

TRANSPORTATION SYSTEM SAFETY AND PROJECT ANALYSIS

Seven papers are compiled, covering the following area
transportation system safety and project analysis: a transp

tion safety index applicable to all modes; the changing baseline in transportation safety; the applicability of behavior theory to transportation; improving traffic safety in rural Kansas; methods for improving analysis of roadside safety; evaluation of completed highway safety projects; and use of traffic-conflicts technique to assess hazards of transporting oversize loads.

by Frances R. Zwanzig, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-709 ; 1979 ; 44p refs
Includes HS-027 259--HS-027 265.
Availability: TRB $3.00

HS-027 259

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES

The basic classes of transportation safety indices based on time, event, activity, and population have special utility for certain modes, but they lack a common basis and general applicability. A failure index (FI) is presented that can be applied to all modes and can allow cross-modal and intramodal comparisons between air carrier and general aviation, highway, rail, rail rapid transit, vessel, and recreational boats. One of the central concepts in the development of the FI is the identification of the functional differences during a trip throughout its various environments where an environment is defined and classified as a function of a specific segment of a trip. By using available data, the FI is calibrated for the case of passenger fatalities. Among the results are that air was found to be less safe than intercity bus or rail for trips of less than 2400 km (1500 mi) and that, for short trips, air is generally less safe than the automobile. The FI is also used to show how two operators that have the same basic safety performance can appear to differ because of route composition (i.e. trip-length distribution).

by Joonho Byun; William R. McShane; Edmund J. Cantilli; Michael Horodniceanu
Polytechnic Inst. of New York, Brooklyn, N.Y.
Publ: HS-027 258 (TRR-709), "Transportation System Safety and Project Analysis," Washington, D.C., 1979 p1-6
1979 ; 3refs
Based on doctoral dissertation of J. Byun. Research sponsored by Dept. of Transportation. See also HS-027 260.
Availability: In HS-027 258

HS-027 260

CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS

Although many countermeasures are introduced to enhance transportation safety, accident experience can vary systematically over time even if no countermeasures are introduced. An examination is presented of factors that cause the safety reference level or baseline to change without other modification of the system. Four case studies are discussed, representative of existing effects on traffic safety: the changing age distribution of the automobile-driving population, the changing urban-rural balance, changes in modal trip lengths or vehicle types, and modal shifts induced by transportation system management actions. Each of these is found to have a significant effect (5% to 10% on the baseline). This analysis illustrates that it is not valid to explicitly or implicitly assume that major societal forces or trends will not cause the safety baseline to change. Key forces exist that will cause future changes in the accident experience large enough to rival or exceed the effects of most rather successful accident countermeasures and that will make some fairly meaningless measures seem useful.

by Joonho Byun; William R. McShane; Edmund J. Cantilli
Polytechnic Inst. of New York, Brooklyn, N.Y.
Publ: HS-027 258 (TRR-709), "Transportation System Safety and Project Analysis," Washington, D.C., 1979 p6-10
1979 ; 4refs
Based on doctoral dissertation of J. Byun. Research sponsored by Dept. of Transportation. See also HS-027 259.
Availability: In HS-027 258

HS-027 261

APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION

The applicability of two theories of behavior, humanistic and behavioristic, to two areas of transportation (safety and modal choice) was investigated in two experiments. The underlying hypothesis of a direct relationship between noncompliance with the speed limit and speed control strategy was first tested. One strategy was based on the humanistic theory that variables controlling operating speeds are: depth of penetration of information relevant to speed control consequences; operator's motivation to become self-actualized by seeking a measure of self-control; and success of the reeducative strategy of driver education. A second strategy was based on the behavioristic theory which hypothesizes that the variables controlling operating speed are the past histories of reinforcement and pushishment relative to the operator speeding behavior. Experiment supported the behavioristic theory, finding public information campaigns ineffective. A second experiment tested the premise that the reinforced choices would be made more often in an environment where positive controls reinforce consumer choice of the public transit and carpool options and do not reinforce the private automobile choice. Participants overwhelmingly indicated private car preference when asked to choose commuting mode. Those randomly assigned to reinforcement and combined (reinforcement and incentive) conditions changed their opinion. Incentives (positive year-end consequences) alone were ineffective in controlling driver behavior. These results also support the behavioristic theory.

by Michael L. Kreindler; Michael Horodniceanu; Edmund J. Cantilli
State Univ. of New York Coll. at Fredonia, N.Y.; Polytechnic Inst. of New York, Brooklyn, N.Y.
Publ: HS-027 258 (TRR-709), "Transportation System Safety and Project Analysis," Washington, D.C., 1979 p10-13
1979 ; 3refs
Availability: In HS-027 258

HS-027 262

IMPROVING TRAFFIC SAFETY IN RURAL KANSAS

In southwestern Kansas, where the population density is less than 4 persons/sq km (10 persons/sq mi), there were no local traffic engineering personnel in the 41,150 sq km (16,000 sq mi) area before 1977. The Greater Southwest Regional Planning Commission created a position of regional traffic engineer (RTE) in late 1976 in an effort to improve traffic safety in this rural area. During the first two years, the engineer has involved 29 of the 45 cities in Federally-funded traffic sign improvement projects, completed or initiated analysis at several high-hazard locations, assisted local units of government to become aware of and obtain state and Federal funds, and worked with local government personnel in 18 of the 19 counties to establish some local expertise in traffic safety. The primary benefit of the RTE has been to personalize traffic engineering in southwestern Kansas, where the local units of government could not individually afford and would not need a full-time traffic engineer. Under the commission assistance plan, the engineer is on call to all the local units, and is governed and used by them.

by Roy C. Loutzenheiser
Greater Southwest Regional Planning Commission, Garden City, Kans.
Publ: HS-027 258 (TRR-709), "Transportation System Safety and Project Analysis," Washington, D.C., 1979 p13-9
1979 ; 4refs
Sponsored by Kansas Dept. of Transportation, and Federal Hwy. Administration.
Availability: In HS-027 258

HS-027 263

METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY

The state of the art in roadside safety improvements is reviewed, with particular attention to the roadside-hazard model developed by Glennon (1974). The model depends on the concept that an injury-producing roadside impact is a result of a sequence of four conditional events: the impacting vehicle must be within the discrete increment of roadway associated with a potential collision with the roadside obstacle, a roadside encroachment must occur, vehicle lateral displacement must be great enough for collision with the roadside obstacle, and the collision must be of sufficient magnitude to produce an injury. This sequence of events suggests a conceptual approach for evaluating the degree of roadside hazard. The need is demonstrated for additional research to validate or add precision to the Glennon model. An empirical accident study is suggested that relates the hazard of specific roadside obstacles to design, operating, and environmental variables. The proposed analysis method assumes a Poisson probability distribution and uses Bayes' theorem for the construction of a discrete model for precisely predicting the hazard of any roadside location.

by John C. Glennon; Michael C. Sharp
Midwest Res. Inst., Kansas City, Mo.
Publ: HS-027 258 (TRR-709), "Transportation System Safety and Project Analysis," Washington, D.C., 1979 p20-5
1979 ; 10refs
Availability: In HS-027 258

HS-027 264

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS

Based on a revew of the literature and current practices, it was concluded that existing techniques for evaluating effectiveness of highway safety projects are appropriate, but that they should be organized into a structured procedure to provide a step-by-step guide for engineers and highway safety personnel. A procedure is described for performing effectiveness evaluations of completed highway safety projects which is drawn from state-of-the-art techniques. The evolution of the procedure included the development of a guide and a three-day training session and workshop for practicing highway safety engineers. Worksheets and data forms were developed to aid the evaluator. The evaluation procedure consists of six functions, each formulated into a series of systematic steps that guide an evaluator through the activities and decision-making processes of a properly designed study. These functions are to develop an evaluation plan; to collect and reduce data; to compare measures of effectiveness; to perform tests of significance; to perform economic analysis;
and to prepare evaluation documentation. Of five case stu
prepared to illustrate the use of the evaluation methodolo
one abbreviated case study is discussed based on a skid-re
ance treatment to a section of an Interstate freeway.

by David D. Perkins; Tapan K. Datta; Rudolph M. Umbs
Goodell-Grivas, Inc., Southfield, Mich.; Wayne State Univ., Civil Engineering Dept., Detroit, Mich.; Federal Hwy. Administration, Washington, D.C. 20590
Publ: HS-027 258 (TRR-709), "Transportation System Safety and Project Analysis," Washington, D.C., 1979 p25-9
1979 ; refs omitted
Sponsored by Federal Hwy. Administration.
Availability: In HS-027 258

HS-027 265

USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSI LOADS

The traffic-conflicts technique was used to assess the haz
associated with transporting oversize loads over highways.
approach was based on the assumption that a driver ap
brakes in response to a perceived danger when following, p
ing, or meeting other vehicles. Field tests were conducte
determine whether there are any differences in the haz
involved in moving 3.7-m (12-ft) wide housing units as c
pared with those of moving 4.3-m (14-ft) wide units. Altho
an analysis of the conflicts indicated that there were no m
differences, the sample size was too small for the results t
accepted with a high degree of confidence. The conflicts
indicated that the large sample sizes needed to establish sta
cally reliable results may not be practical, but the technique
useful in determining the types and relative frequencies of
ards associated with the movement of wide loads over a va
of highway systems. As a measure for assessing the hazard
moving wide loads, the conflicts technique provided more
tailed information in a short period of time than could
been obtained from a conventional accident analysis.

by Martin R. Parker, Jr.
Virginia Hwy. and Transportation Res. Council, Charlottesv
Va.
Publ: HS-027 258 (TRR-709), "Transportation System Safety
and Project Analysis," Washington, D.C., 1979 p30-8
1979 ; 14refs
Availability: In HS-027 258

HS-027 266

HIGHWAY ACCIDENT REPORT. FORD COURIE PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAN APRIL 23, 1979

A compact pickup truck with 12 teenagers as occupants, tr
ing between 64 and 78 mph along a winding country road
Crofton, Maryland, failed to negotiate a curve to the left.
truck ran off the right side of the road and struck three
located about 7 ft from the edge of the pavement. Ten pa
gers were killed, and one was seriously injured; the driver
injured slightly. It was determined that the probable caus
the accident was high-speed, reckless driving by a person
was under the influence of alcohol and marijuana. Contribu
to the severe consequences was the presence of passenge
the open bed of the pickup, an area that offered no c
protection. Ball bank indicator tests showed about 30 mph
an appropriate, comfortable speed for negotiating the c
where the accident occurred. Although the truck's shoulde

belts appeared to have been purposely lodged behind the seat cushions, it was determined that even with lap and shoulder belts properly fastened, the passengers would probably not have survived. The driver probably survived the collision because he was laterally farther away from direct contact with the trees, he was not ejected from the cab, and other passengers cushioned him from the interior of the vehicle. A recommendation is made to the National Com. on Uniform Traffic Laws and Ordinances to establish model guidelines for prohibiting passengers from riding in open-cargo areas of vehicles being used for nonwork-related purposes.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-79-6 ; 1979 ; 22p 14refs
Availability: NTIS

HS-027 267

EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL

The major purpose of this study was to investigate helmet-use behavior of motorcycle operators using the Fishbein Model for the prediction of behavioral intentions. Data were collected during personal interviews at motorcycle dealerships on a multistage cluster sample of 235 motorcycle operators in Illinois, a state without a helmet use law. A follow-up telephone survey of the sample was conducted to obtain self-reported data on subsequent helmet use behavior (50% response rate). Results show that 53% of the variance in behavioral intentions to wear a helmet when riding a motorcycle could be explained from attitudinal and social-normative factors. The decision to use a helmet was found to be primarily under attitudinal rather than social-normative control. Subjects who intended to wear a helmet generally had stronger beliefs about safety, minimized discomfort and inconvenience, and were less likely to hold inaccurate beliefs about alleged helmet disadvantages than nonintenders. There was no discrimination for social image, and no evidence that perceived susceptibility or seriousness influenced beliefs. Self-reported frequency of helmet use was associated with certain variables: motorcycle make, engine size, participation in motorcycle safety course, education level, membership in organized motorcycle club and American Motorcyclist Assoc., and self-reported frequency of seat belt use, and several motorcycle operating conditions. Findins indicate that nonintenders are generally not as informed about safety consequences of helmet use as are intenders. A social policy stressing an informational as well as legislative approach to the nonuse problem is recommended.

by John Philip Allegrante
University of Illinois at Urbana-Champaign
1979 ; 163p 100refs
Doctoral dissertation. Research sponsored by Motorcycle Safety Foundation.
Availability: Motorcycle Safety Foundation, Res. Dept., 780 Elkridge Landing Rd., Linthicum, Md. 21090

HS-027 268

NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION

Drivers exposed to the New York State Drinking Driver Rehabilitation Prog. (DDRP) were found to have a lower conviction rate for alcohol-related (A/R) violations for a post-treatment period (Apr-May 1976 thru Sep-Oct 1977) than for a pre-treatment period (Sep-Oct 1974 thru May-Apr 1976). This finding is consistent with an Oct 1978 Status Report on the DDRP (appended). DDRP drivers had a lower conviction rate for all types of traffic violations following treatment when compared with a sample of all drivers with at least one conviction. DDRP drivers experienced a significant reduction in both number and rate of accidents. Drivers who completed rehabilitation programs, including drivers not granted a conditional license privilege, exhibited significant reductions in the incidence of all convictions, A/R convictions, and accidents following treatment. Drivers who did not complete the program, but who had some classroom instruction, exhibited fewer post-treatment A/R violations and fewer accidents than in the pre-treatment period.

New York State Dept. of Motor Vehicles, Div. of Res. and Devel.
AL-77-001
1978 ; 139p 2refs
Availability: Corporate author

HS-027 269

PASSENGER COMFORT--AN OVERVIEW

The concept of comfort (riding, local, and organizational) and its relationship to travel experiences of passengers is considered. Papers in this special issue are intended to emphasize and elucidate aspects of Mayr's (1959) riding comfort analysis (subjective, technical/structural, psychological, and physiological factors). Factors in the transport environment likely to influence comfort are reviewed, with pertinent studies cited. These secondary, marginal, and integration factors, as opposed to primary comfort factors considered in the basic vehicle design stage, include temperature, ventilation, illumination, photic stimulation (giving rise to "flicker vertigo"), train or photokinetic nystagmus, pressure change on the ear, journey length, and task impairment (e.g. reading or writing) by vibration and noise.

by D. J. Oborne
Publ: Applied Ergonomics v9 n3 p131-6 (Sep 1978)
1978 ; 24refs
Special issue: Ergonomics for Passenger Comfort. See also HS-027 270 and HS-027 271.
Availability: See publication

HS-027 270

VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?

Field and laboratory studies of human reaction to whole-body vibration are reviewed in an attempt to determine to what extent laboratory results may be used to predict comfort levels for passenger vehicles. The aim of some studies has been to describe the manner in which human response to vibration varies over a specific frequency range, by ascribing descriptive comfort labels to contours of equal subjective intensity. Studies including both laboratory and field situations used subjects other than fare-paying passengers. These studies show that little agreement exists among various investigators on the difference between "comfortable" and "uncomfortable" levels of vibration. More recent studies, all inconclusive, investigate human reaction to vibration simply in terms of equal sensation curves without reference to any one particular comfort level. Some attempts have been made to combine existing information to provide criteria or standards for determining human reaction to vibration. From this review, it is concluded that laboratory data may be used by the design engineer, provided their limitations are realized. Although the data will not precisely predict passenger reaction, any discrepancy will cause the engineer to tend to err on the side of reducing vibration levels below those required by the passenger.

by D. J. Oborne
Publ: Applied Ergonomics v9 n3 p155-61 (Sep 1978)
1978 ; 30refs
Special issue: Ergonomics for Passenger Comfort.
Availability: See publication

HS-027 271

MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS

Extensive field studies have been conducted to determine the physical correlates of perceived comfort for passengers in vehicle environments. Passengers' experiences of comfort were assessed upon exposure to various levels of motion, noise, temperature, pressure, and different seats and spatial arrangements. For each of the many vehicle types studied, models were developed relating physical variation to rated comfort. Some similarities in these models suggest that a composite model for human reaction to all vehicles may be feasible. The mathematical formulations are simple multiple regression equations. Air mode studies have shown that comfort is a function of vertical and transverse accelerations, noise levels, and seat factors, as well as maneuver conditions. Comfort models for ground-based vehicles (buses, trains) involve roll rates and noise levels.

by I. D. Jacobson; L. G. Richards; A. R. Kuhlthau
Publ: Applied Ergonomics v9 n3 p169-72 (Sep 1978)
1978 ; 9refs
Special issue: Ergonomics for Passenger Comfort.
Availability: See publication

HS-027 272

FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION

Combustion in a divided-chamber, stratified-charge engine is considered, and flame and pressure results obtained with a two-dimensional unsteady model are compared with corresponding engine data. The model is applied to eight engine conditions differing in speed, load and size of the prechamber orifice. The model employs one overall chemical reaction rate, the turbulence energy and its dissipation rate, and a wall heat loss proportional to the heat release. The computed results are shown to be in good agreement with the experimental ones in spite of the complexity of the problem and the early stages of detailed model validation studies. They are also shown to compare somewhat better than earlier ones obtained with an ad-hoc jet turbulence model. Both studies prove the importance of the prechamber jet to the overall combustion process for the particular engine investigated. Since divided chamber configurations are considerably more complex than open chamber ones, the model should be applicable to a variety of engine designs. Current and past experience indicates the model should be particularly useful in combustion optimization studies, during engine development, as a means to interpret and extrapolate engine test data.

by S. A. Syed; F. V. Bracco
Princeton Univ., Mechanical and Aerospace Engineering Dept.
Rept. No. SAE-790247 ; 1979 ; 18p 22refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Research sponsored by Volkswagenwerk AG.
Availability: SAE

HS-027 273

THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS

Australian Design Rules (ADR) 22 and 22A are described which require head restraints on driver and front left seats of all new cars in Australia, beginning with 1972 models. The effective heights of these restraints are discussed, as well as the nature of whiplash injuries which they are designed to prevent. Studies of head restraint effectiveness are reviewed. Data on 1974-1975 claims to the Motor Accidents Board in Victoria for injury compensation are analyzed to evaluate the effectiveness of ADR 22. Potential benefit groups (front outboard seat occupants in rear-end impacts) and disbenefit groups (rear seat occupants in front-end impacts) are considered, as well as other occupants and crash circumstances as a control for crash severity differences. It is concluded that there is weak evidence that ADR 22 is effective in reducing whiplash injuries sustained in rear impacts. The benefit is almost entirely confined to female occupants of front left seats. There is no evidence of disbenefits in terms of head or facial injuries to rear seat occupants. There is evidence of disbenefits in terms of whiplash and major intracranial injuries to drivers involved in frontal impacts in ADR 22 cars compared with pre-ADR 22 cars. The absence of information on crash severity and seat belt use precludes definitive conclusions.

by M. H. Cameron; J. P. Wessels
M. H. Cameron and Associates, 17 Myrtle Grove, Blackburn, Vic. 3130, Australia
Rept. No. CR-5 ; 1979 ; 80p 20refs
Sponsored by Commonwealth Dept. of Transport (Australia).
Availability: Commonwealth Dept. of Transport, Office of Road Safety, Australia

HS-027 274

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE

Following the implementation of compulsory seat belt use legislation in Victoria, Australia (Dec 1970), the Royal Australasian Coll. of Surgeons established a survey to collect detailed injury and crash data on car accidents in that state. An analysis is reviewed of the effect of seat belt use on severe injuries sustained by car occupants during the first two years of the survey as reported by Cameron and Nelson (1977). Also reviewed is an extended file covering 8537 occupants injured during the first three years of the survey with the injuries (including minor ones) coded according to the Abbreviated Injury Scale. The effect of seat belt use on both minor and severe injuries is examined, with some comparisons between injury severity distributions in the Victorian data and those from data collected in the U.S. by multidisciplinary accident investigation teams. It is concluded that the wearing of static three-point lap/sash belts by front outboard occupants is associated with reduced likelihood of severe-to-fatal injuries to the head-face, thorax, lower torso, and lower extremities for crashes in urban areas and for occupants injured but not ejected, and to some body regions for rural crashes. It is also concluded that for these same occupants, seat belt use is associated with increased likelihood of minor injuries to the thorax and lower torso in both rural and urban accidents, and increased likelihood of minor neck injury (i.e. whiplash) in urban accidents. The absence of crash severity data precludes a definitive evaluation of seat belt effect alone on injuries.

by M. H. Cameron
M. H. Cameron and Associates, 17 Myrtle Grove, Blackburn, Vic. 3130, Australia
Rept. No. CR-4 ; 1979 ; 46p 6refs
Sponsored by Commonwealth Dept. of Transport (Australia).
Availability: Commonwealth Dept. of Transport, Office of Road Safety, Australia

HS-027 275

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS

A field investigation was performed of the effect of driver's age on nighttime legibility of highway signs, using subjects in two age groups (under 25 and over 61 years of age), screened by tests for color vision and far acuity under high and low luminance (80.5-2.3 cd/sq m). The results confirm those of previous laboratory tests, demonstrating that the legibility distances for older subjects were 65% to 77% of those for younger subjects with equal high-luminance visual acuity. An important implication is that older drivers are likely to have less time available in which to act on sign information. Consequently, it is argued that legibility standards for highway signs should not be based exclusively on data obtained from young observers, and that standard (high-luminance) acuity tests have questionable relevance to nighttime visual performance.

by Michael Sivak; Paul L. Olson; Leon A. Pastalan
University of Michigan, Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-52 ; 1979 ; 20p 4refs
Sponsored by National Retired Teachers Assoc. and American Assoc. of Retired Persons.
Availability: Corporate author

HS-027 276

NEW TRANSPORTATION SYSTEMS AND TECHNOLOGY--1979

Four papers are compiled which cover various aspects of new transportation systems: a patronage estimate for downtown people movers, development of efficient central management strategies for advanced group rapid transit systems, electric cars for urban transportation, and assessment of market potentials for electrical vehicles.

by Susan Singer-Bart, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-708 ; 1979 ; 33p refs
Includes HS-027 277 and HS-027 278. Prepared for presentation at 58th annual meeting of Transportation Res. Board.
Availability: TRB

HS-027 277

ELECTRIC CARS FOR URBAN TRANSPORTATION

An investigation of the effects of large-scale use of electric cars on energy, the environment, and the economy in the U.S. is summarized. If all automobiles in the U.S. were electrified by the year 2000, petroleum requirements for automotive travel would be reduced by 83%. Electric cars would substantially reduce the regional emissions of pollutants primarily due to vehicles (hydrocarbons and carbon monoxide), although this would be offset by increases of up to 20% in sulfur oxides emissions due to fossil-fueled power plants that generate recharge power. Substitution of electric cars for all internal combustion cars would reduce noise impacts by almost half, to about 20% of the 1974 level. Despite their availability from a major manufacturer by 1990, sales of electric cars are expected to be relatively modest (under 10% of the U.S. automobile fleet in the year 2000). Although future electric cars will be capable and economical, they will still cost somewhat more and do somewhat less than competing conventional automobiles. Where pollution, conservation, and continued high mobility are important considerations in transportation system planning, electric cars deserve to be considered along with such frequently proposed measures as parking restrictions, exclusive bus and carpool lanes, automobile taxation, and transit subsidy.

by William Hamilton
General Res. Corp., Santa Barbara, Calif.
Publ: HS-027 276 (TRR-708), "New Transportation Systems and Technology," Washington, D.C., 1979 p16-21
1979 ; 10refs
Summary of study sponsored by Dept. of Energy. Prepared for presentation at 58th annual meeting of Transportation Res. Board.
Availability: In HS-027 276

HS-027 278

ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES

The development and application of a market assessment model is described which analyzes the potential for the substitution of electric vehicles (EV's) for conventional vehicles by identifying generic vehicle type and user groups, and determining the compatibility of an EV to the travel and service requirements of the user groups. The model uses stratified household travel data to simulate typical daily travel patterns throughout the year. Alternative scenarios of vehicle use are introduced to relate the sensitivity of the market potentials to household travel behavior. An approach to analyzing commercial EV market potentials is also presented. Results of passenger vehicle analysis reveal the interrelationships among the vehicle range distributions, the patterns of vehicle use, and the household travel characteristics, specifically trip frequency and length. Changes in use patterns or travel behavior can have a pronounced impact, both positive and negative, on EV range requirements. Changes may also be brought about by technology or market factors as well as by changes in lifestyle, which are quite independent of transportation system factors. It is suggested that the introduction of low- to medium-range EV's will have only a marginal effect on reducing petroleum consumption. Much more information is needed before credible sales estimates can be made. In the interim, systematic market potential estimates can play an important role in EV technology and resource allocation decisions.

by Oreste M. Bevilacqua; Victor Maslanka
De Leuw, Cather and Co., San Francisco, Calif.; Wilbur Smith and Associates, New Haven, Conn.
Publ: HS-027 276 (TRR-708), "New Transportation Systems and Technology," Washington, D.C., 1979 p21-7
1979 ; 6refs
Prepared for presentation at 58th annual meeting of Transportation Res. Board.
Availability: In HS-027 276

HS-027 279

DEVELOPMENTS IN AUTOMOTIVE ELECTRONICS

The current state of the art of automotive electric systems is reviewed, with particular emphasis on systems which improve driver safety and vehicle efficiency. A discussion of cost and reliability concludes that from 1980-1981 onward, the cost of electronic-components will no longer be a major inhibiting factor, and that between 1979 and 1981, the reliability of electronic components/systems will improve to a point where they will offer a substantial benefit over mechanical or electromechanical systems. The main features of six vehicle systems in which electronics will likely be important or dominant elements by 1985 are described. These are: engine management, transmission control, electronic instrumentation, traffic and road information, multiplex ring main distribution, and antiskid brakes. Details are included of how microprocessor or minicomputer techniques are used in these systems. Minor systems in which electronics will have an increased role are mentioned: electronic headlamp dip/dim systems, automatic temperature control, seat belt and other safety system monitoring and warning, speed control, and driver diagnostics for fluid levels, bulb failure, brake pad wear, and tire pressure. Two areas in which significant development is likely are suspension rate and deflection control, and vehicle collision warning radar.

by M. H. Westbrook
Publ: Automotive Engineer v4 n4 p19-23 (Aug-Sep 1979)
1979
Availability: See publication

HS-027 280

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES

Experimental studies on a mildly turbocharged (TC) spark ignition engine with thermal reactor demonstrated that it is feasible to use alcohol to extend the octane rating of gasolines, but indicated the need for correct timing and carburetion for each alcohol-gasoline mixture to obtain optimum economy. Up to 30% alcohol doped fuels behaved in a similar manner to pure gasoline in this TC engine. The alcohol did not appear to affect the carbon monoxide or nitrogen oxides (NOx) emissions, but alcohol concentrations of 20% or more increased hydrocarbon emissions. Of various concentrations of exhaust gas recirculation, the best quantity was found to be approximately 5% by volume, which gave a large reduction in NOx emissions and little loss of fuel economy or performance. The 2-litre TC engine is rated at 69 kW at 4000 rpm WOT (wide open throttle) and, with a peak torque of 170 Nm at 2500 rpm WOT available, an effective torque curve for normal passenger car use is obtained.

by S. J. Goddard; D. C. McWhannell
SRC-B/RG/59416
Publ: Automotive Engineer v4 n4 p51-4 (Aug-Sep 1979)
1979 ; 9refs
Availability: See publication

HS-027 281

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT

Various papers delivered at a recent Institute of Mechanical Engineers Automobile Div. conference in London are reviewed,
which cover fuel economy and emissions of lean-burn engi
Two important points to come from the meeting are that
fundamentals of air movement and combustion are finally be
widely investigated, but that production versions of lean-b
engines will not be realized for a long time. These engines o
fuel consumption reductions with low emissions. Although
emission levels are not low enough to meet U.S. and Japan
standards without some additional treatment, they could m
future requirements in Europe. Individual research efforts
scribed cover lean burning in three different engines, mix
devices in the induction system, turbulent-flow manifolds, a
on devices to improve performance and reduce fuel consur
tion, modeling of mixture formation in the intake manifold,
swirl and squish, incompletely burned cycles, and dual ignit
systems. In a summation of the conference, it was ackno
edged that high-compression lean-burn engines offer the pot
tial of a 20% reduction in fuel consumption and therefore m
attention, but that the questions about emission remain un
solved.

by John Hartley
Publ: Automotive Engineer v4 n4 p55-8 (Aug-Sep 1979)
1979
Availability: See publication

HS-027 282

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)

Road users are advised to be alert to certain warnings of
proaching danger, in order to reduce accident numbers. A c
scious effort should be made to drive defensively and anticip
dangerous situations before they occur. A defensive motor
for example, recognizes the signs of a drunk driver and is aw
that a rolling ball on the street is likely to be followed b
child. A defensive bicyclist is constantly on the alert fo
parked motorist who might pull out or open a car door into
path. A defensive motorcyclist is alert to oil on street surfa
A defensive pedestrian never gambles on a right-of-way w
crossing in a crosswalk or with a green light. A defensive r
user has to be a part-time psychologist. Many of the less "ol
ous" warning signs of impending danger require some comn
sense and logic. For example, a driver would do well to
ceed with extreme caution if he notices a sudden absence
traffic in the other lane as he approaches a blind curve; this
indicate an accident ahead. Noticing the situation not only a
develops, but before it develops, is the key to staying alive
our nation's roads.

by Thomas Mach
Publ: California Highway Patrolman v43 n7 p6-7, 26 (Sep 19
1979
Availability: See publication

HS-027 283

GUIDELINES FOR THE APPLICATION OF ARRO BOARDS IN WORK ZONES. FINAL REPORT

A study to develop objective criteria for the use, design,
placement of arrow boards in roadway work zones is repor
The study included a review of the literature on work z
traffic control; human factors investigations of driver infor
tion requirements, expectancy, and understanding of ar
boards; and an intensive field study of driver responses to ar
boards in actual work zones. Studies were made of 26 constr
tion sites and 23 hours of maintenance activities. Each phas

the study is described; appended are definitions of terms, the arrow board guidelines, detailed field study results, and a description of the statistical approach used to determine significant effects of arrow board use. The research determined that arrow boards were effective in lane closure work zones because they promoted earlier merging into the open lane and fewer vehicles remained in the closed lane at the start of the lane closure taper. The arrow board was more effective when placed on the shoulder of the roadway near the start of the lane closure taper. Arrow boards were not found to be generally effective in traffic diversions or splits or for moving shoulder closures. They did, however, prove effective in reducing some specific operational problems in these types of work zones.

by Jerry L. Graham; Donald J. Migletz; John C. Glennon
Midwest Res. Inst., 425 Volker Blvd., Kansas City, Mo. 64110
DOT-FH-11-9352
Rept. No. FHWA-RD-79-58; MRI-4463-D ; 1978 ; 164p 30refs
Rept. for Oct 1977-Feb 1979.
Availability: NTIS

HS-027 284

TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY

The main findings of a series of related studies of the travel characteristics and problems of physically handicapped people are summarized. The studies included a survey of organizations for handicapped people, a travel behavior study of selected handicapped persons, surveys of physically handicapped travelers and nontravelers living in Coventry, England, and a literature survey (TRRL-WP/10). Walking was found to be the most frequently used form of transport for handicapped persons, followed by car, then bus; other modes did not provide a significant amount of mobility. Problems were encountered in using pedestrian facilities as a result of width, uneven surfaces, and changes in level at curbs. Wherever possible, the handicapped individual would benefit from the minimization of walking distances and the provision of seats at strategic points such as bus stops and interchanges. The provision of wide and level access to public transit vehicles, and of alternatives for level changing at terminals, would greatly reduce the number of obstacles facing the handicapped traveler. It is important that changes in level are reduced to a minimum for all modes of transport. Operational rather than design factors presented difficulties for handicapped persons riding buses (e.g. bus moving before passengers seated, stopping too far from curb). Information about special facilities provided by British Rail for elderly and handicapped persons needs more publicity. Some form of door-to-door transport appears to be the only means of meeting any potential travel demand from the more seriously handicapped population.

by R. J. Feeney; N. J. Ashford; Anne Morris; D. Gazely
Loughborough Univ. of Technology, Leics., England
Rept. No. TRRL-SR-480 ; 1979 ; 20p 8refs
Sponsored by Transport and Road Res. Lab.
Availability: Transport and Road Res. Lab., Access and Mobility Div., Crowthorne, Berks., England

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HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)

An experimental bicycle route network operating between Nov 1975 and Jun 1976 in Portsmouth, England, was evaluated in the following terms: effectiveness of special traffic management techniques (the central lane marked as a cycle lane, special junctions intended to bar through motor vehicle traffic, one-way streets for motor vehicles on two route sections, and "all motor vehicles prohibited" signs); changes in motor vehicle and bicycle flows resulting from the introduction of the cycle route; and changes in the number of accidents. The routes, 6.3 km in total length on residential roads, were designed to provide a quick, safe, and convenient roadway system for bicyclists between selected residential areas and certain schools, shopping areas, and workplaces. Motor vehicle traffic was prohibited except for local access at designated points. It was found that substantial proportions of motorists did not obey the various restrictions. The central lane operated as intended and the cyclists did move into the center of the road where they were more conspicuous and the surface was better. There were operational difficulties with the lane, however, as motorists had difficulty passing on the inside of cyclists. Motor vehicle traffic flow was reduced by about two-fifths. Cycle flow rose by about one-third, at least half attributable to the experimental measures. No significant changes in the number of accidents involving bicyclists were detected during the experiment as the annual numbers of accidents before and during the experiment were low.

by F. J. Nicholson
Transport and Road Res. Lab., Access and Mobility Div., Crowthorne, Berks., England
Rept. No. TRRL-LR-874 ; 1979 ; 29p 3refs
Pt. 3, Attitude Surveys, is HS-027 286.
Availability: Corporate author

HS-027 286

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)

An experimental system of bicycle routes was in use between Nov 1975 and Jun 1976 in Portsmouth, England. The routes, 6.3 km in total length, on residential roads, were designed to provide a quick, safe, and convenient roadway system for bicyclists between selected residential areas and certain schools, shopping areas, and workplaces. Motor vehicle traffic was prohibited except for local access. Attitude surveys conducted three and six months after the opening of the routes indicated that most residents on the routes considered that they had been unaffected by the scheme or were actively in favor of it. Most cyclists had a favorable opinion, but greatly criticized motorists for ignoring traffic signs along the routes and for lack of consideration for cyclists. About half of the 39 shopkeepers on the routes claimed that they had lost some business because of the system. Most of the complaints from a sample of motorists concerned the need to make detours. Apart from adequately meeting its design aims, the experiment provided valuable information on the operation and monitoring of cycle routes and on public attitudes. The information was used to plan and monitor more advanced cycle routes in other British cities.

by S. W. Quenault
Transport and Road Res. Lab., Access and Mobility Div., Crowthorne, Berks., England
Rept. No. TRRL-LR-875 ; 1979 ; 31p 2refs
Pt. 2, Traffic Studies, is HS-027 285.
Availability: Corporate author

HS-027 287

THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS

Six designs of inertia reel seat belts from two British manufacturers (Britax (Wingard) and Kangol), some current models and others no longer in production but still in use, were tested to identify possible problems relating to the malfunction of the locking mechanism under heavy braking or impact conditions. The malfunction known as "edge-locking" (tip-to-tip tooth engagement of a locking pawl or cog), was specifically investigated. A few samples of certain inertia reels which appear superficially to function correctly, did not lock correctly on a small number of occasions in car impacts. Improvements in the design and construction of some models seem necessary if edge-locking and excessive reel-out in accidents are to be avoided. The best estimate of the rate of faulty operation in severe accidents (50kph) for both the Britax Autolok MkIII and MkIIIA is about 2%. The Britax Surelok, Kangol Reflex, and Kangol Euroflex appear to be superior in this aspect of performance. There was no failure of the Surelok and Euroflex in these tests. If assembled correctly, the Kangol Series 12 reel appears to be satisfactory. Of the 20 reels of this design examined, only one appeared to have a manufacturing fault. The best estimate for the rate of faulty operation of this reel is 1% in severe accidents. There is a case for an appropriate test in the relevant standards and regulations to assess the risk of reel-out following edge-locking.

by R. W. Lowne; A. K. Roberts; G. R. Watts
Transport and Road Res. Lab., Vehicle Safety Div.,
Crowthorne, Berks., England
Rept. No. TRRL-LR-882 ; 1979 ; 30p 6refs
Availability: Corporate author

HS-027 288

CAR BUYING FOR THE '80S

Some insight is given concerning what the prospective car buyer can expect on the market in the 1980's: smaller size, turbocharging, front-wheel drive, more microprocessor applications, run-flat tires, air bags, and possibly, antiskid brakes. However, it is stated that, essentially, what is available today is what one will be able to get in 1985. The potential for various alternative powerplants is assessed, including electric systems, the Stirling cycle (external combustion), the Brayton cycle (gas turbine), and fuel cells. The consumer, whatever his particular view of the future, is advised to contemplate the kind of economic, political, and social changes there might be and make some judgments about how they will affect his car ownership. Some new or imminent marketing techniques confronting the car buyer are reported in a separate section: the price pack or return to the dealer practice of adding extra charges to the price sticker (e.g. "delivery and handling" charges, "profit"), long-term installment contracts, extended warranties, leasing, and more wariness on the part of dealers in making unfounded claims in light of increasing consumer protection. Another section advises the prospective buyer to determine actual automotive needs, make money choices, buy no more car than is needed, and inspect the car before taking delivery.

by Leon Mandel
Publ: Motor Trend v31 n10 p59-62, 65 (Oct 1979)
1979 ; refs
Availability: See publication

HS-027 289

HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS

The key parameters controlling the productivity and the cost of net high-grade fuel from a system for biomass agriculture and conversion are analyzed. Performance depends on a "symbiotic" interaction between agronomy and conversion technology. This includes, in agronomy, high-grade fuel energy support of agriculture, and in technology, energy efficient conversion. The conditions for obtaining net productivity and costs are explored, with U.S. grain alcohol as a reference point. Currently practical technology consumes more high-grade fuel (petroleum and gas) than it generates in the form of grain alcohol. Some potentials and constraints for future systems are explored, including use of other plant species and conversion systems. Positive net productivity can be attained, but it requires the elimination of high-grade fuel input to the alcohol process facility.

by Paul B. Weisz; John F. Marshall
Publ: Science v206 n4414 p24-9 (Oct 1979)
1979 ; 21refs
Based on paper presented at International Symposium on Energy and Technology meeting of International Assoc. of Science and Technology for Development, Montreux, Switzerland, Jun 1979.
Availability: See publication

HS-027 290

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE

An overview is provided of road accidents as a major economic, social, and public health problem. The creation of the International Drivers' Behavior Res. Assoc. (IDBRA) in 1970, and the organization's research objectives and initial achievements are described, including completion of first cross-national driver behavior research project and organization of the First International Conference on Driver Behavior. Conflicting goals among special-interest groups are mentioned as deterrents to road safety progress. Some immediate and long-term effects of the energy crisis on road safety are discussed. Difficulties encountered by IDBRA in its cross-national analyses of road transport and accident information and statistics are described, as are tabulated data derived from the analyses and current approaches being taken by IDBRA to improving road accident statistics. The need to study the various factors that influence the number of road accidents and their severity, with particular emphasis on human factors, is addressed. Comparative statistical tables from IDBRA's cross-national study are included for 14 of the 15 countries studied (U.S.S.R. excluded): Belgium, Switzerland, Federal Republic of Germany, Denmark, Spain, France, U.K., Israel, Japan, The Netherlands, New Zealand, Sweden, Yugoslavia, and South Africa.

by Timothy Benjamin
International Drivers' Behaviour Res. Assoc., c/o Organisme National de Securite Routiere, 2, Avenue du General Malleret-Joinville, F-94114 Arcueil Cedex, France
1977? ; 53p refs
Text in English and French. Pt. 2, Drivers' Attitudes and Opinions, is HS-027 291.
Availability: Corporate author

HS-027 291

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 2. DRIVERS' ATTITUDES AND OPINIONS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 2. LES ATTITUDES ET LES OPINIONS DES CONDUCTEURS)

Results are presented of a comparative survey of the following nine countries concerning drivers' attitudes and opinions on various aspects of road safety: South Africa, Spain, France, U.K., Japan, Federal Republic of Germany, Sweden, Yugoslavia, and U.S.S.R. Characteristics of the sampled driver populations are also provided (age, sex, vehicle usually driven, socio-economic category, community size, and accident history). It was found that there is apparently a great similarity in the opinions expressed at the cross-national level. The rank order of responses to multiple choice questions is practically identical in all of the surveyed countries. The Japanese results show the least conformity with the overall findings. The Soviet Union, Sweden, and the U.K. had the most moderate replies. The spread in the degree of agreement among countries varies considerably according to the particular question. Replies with a wide spread concerned the following items: frequency of seat belt wearing, risk-taking when being followed by another vehicle, agreement that overtaking is the most dangerous maneuver, belief that human factors are the most important cause of accidents, belief that changes in the layout of roads is the priority improvement for road networks, and belief that one drives more safely than other drivers. Replies with a narrow spread involve the following items: belief that other drivers do not keep to speed limits, belief in the increased risk of being injured in a road accident during the next ten years, opinion that inattention is the principal human cause of accidents, importance of the role of alcohol in accidents, recognition of driver training and testing as a priority need, and agreement that headways are insufficient on high-speed, busy roads.

by Jean L'Hoste
International Drivers' Behaviour Res. Assoc., c/o Organisme National de Securite Routiere, 2, Avenue du General Malleret-Joinville, F-94114 Arcueil Cedex, France
1977? ; 69p 1ref
Text in English and French. Pt. 1, Background Facts and Statistics, is HS-027 290.
Availability: Corporate author

HS-027 292

SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS

Eight papers are compiled which individually discuss simulation technology as applied in transportation areas or traffic accident records systems. The following topics are covered: maritime research at the Computer-Aided Operations Res. Facility (National Maritime Res. Center, Kings Point, N.Y.); the Santa Fe Railway's locomotive engineer training program (which utilizes a locomotive and train simulator); automobile research simulators; computerized street index for the Michigan accident location index system; automated collision (roadway) diagrams; development and use of a data base of commercial vehicle accident in California; and analysis of bicycle delays at intersections and crossings by computer simulation.

by Mary McLaughlin, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-706 ; 1979 ; 50p refs
Includes HS-027 293--HS-027 298. Prepared for presentation at 58th annual meeting of the Transportation Res. Board.
Availability: TRB $3.00

HS-027 293

AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES

The capabilities of the following kinds of research-oriented driving simulators (listed by type of visual display) are reviewed: electronically generated imagery, digital computer-generated imagery, point light source, movie film, and scale models (terrain board or endless belt). The basic elements of a general, fixed-base driving simulator are described. Two approaches to driving simulation are discussed in detail as examples of the state of the art of visual display. The first represents a hybrid approach, in which analog and digital computers and electronic circuits are combined to accomplish the various computational requirements. The second approach, which is primarily mechanized, uses a digital computer in which simulator control is accomplished mainly by means of high-level language software. The advantages that simulators have over other approaches are salient factors, safety, cost, experimental control, and performance measurement. Anticipated future developments in simulation technology related to research, driver training, and licensing applications are discussed. Simulator operational factors to be considered in cost-benefit considerations are outlined, including requirements for visual display, motion, audition, and controls.

by R. Wade Allen; Richard H. Klein; Kenneth Ziedman
Systems Technology, Inc., Hawthorne, Calif.; Southern California Res. Inst., Los Angeles, Calif.
Publ: HS-027 292 (TRR-706), "Simulation Technology and Traffic Accident Records Systems," Washington, D.C., 1979 p9-15
1979 ; 22refs
Prepared for presentation at 58th annual meeting of the Transportation Res. Board.
Availability: In HS-027 292

HS-027 294

DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS

A traffic records system for small and medium-sized cities and counties has been designed for maximum utlization of manual record-keeping procedures and for use as a supplement to existing criminal justice records. The system was developed on the basis of a survey of existing traffic records systems in Tennessee and a review of the literature on traffic records system development. The three basic components of the system are input data, a filing system, and output reports. Each component consists of mandatory and recommended elements. Basic input data may include accident report forms, supplemental accident-related reports, citation records, alcohol influence reports, complaint reports, and enforcement records. The elements of the filing system may consist of accident report files, spot map, driver record file, location file, complaint file, enforcement file, and alcohol influence report. Output reports may include the accident summary, high-accident-rate location summary, spot map, selective enforcement summary, alcohol influence summary, and special reports. Three levels of record keeping are recommended, depending on the volume of traffic records and the capabilities of each jurisdiction. A manual was developed for use by cities and counties in organizing and maintaining a records system and for use as a text for traffic records seminars. A follow-up project is planned in which a series of seminars on the use of the system will be conducted throughout Tenessee.

by Martin E. Lipinski
Memphis State Univ., Dept. of Civil Engineering
Publ: HS-027 292 (TRR-706), "Simulation Technology and Traffic Accident Records Systems," Washington, D.C., 1979
p15-20
1979 ; 7refs
Prepared for presentation at 58th annual meeting of the Transportation Res. Board. Sponsored by Tennessee Governor's Hwy. Safety Prog.
Availability: In HS-027 292

HS-027 295

COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM

The Michigan Dept. of State Police and Dept. of State Highways and Transportation have developed a comprehensive, computerized system of accident inventory called the Michigan Accident Location Index (MALI). The 192,000 km (120,000 mi) of the state's roadway network were computerized in three tasks: data coding, data entry, and resolution of edit and cross-reference errors. The use of computer programs resulted in fast, accurate, and cost-effective methodology. The MALI system is designed to generate a computerized description of traffic accident locations directly from the physical location information observed and reported by police officers. Through this system, identification, surveillance, and maintenance of hazardous locations will be facilitated. All accidents are referenced by distance and direction from the nearest cross-street intersection. The MALI system is designed to produce a variety of accident reports on a county-by-county basis. Currently, 34 counties are fully indexed and on-line: the remaining 49 counties are in various stages of being merged with the master accident file.

by Tapan K. Datta; Richard J. Rodgers
Wayne State Univ., Detroit, Mich.; Goodell-Grivas, Inc., Southfield, Mich.
Publ: HS-027 292 (TRR-706), "Simulation Technology and Traffic Accident Records Systems," Washington, D.C., 1979
p20-2
1979 ; 3refs
Prepared for presentation at 58th annual meeting of the Transportation Res. Board. Sponsored by a Section 402 (Hwy. Safety Act of 1966) Federal safety grant secured by Michigan Office of Hwy. Safety Planning.
Availability: In HS-027 292

HS-027 296

AUTOMATED COLLISION DIAGRAMS

Software to produce automated collision diagrams was developed to satisfy a need of the Traffic Improvement Assoc. of Oakland County, Mich. This nonprofit organization, supported by public and private donations, supplies traffic engineering services to more than 30 political jurisdictions in that county and maintains a comprehensive accident inventory. The software, designated the automated collision diagram system (ACDS), is user oriented and requires only minimal familiarity with computer operations. The system uses existing computer-based accident files directly, is cost-effective to use, and produces a realistic representation of accident experience at a specific location, either an intersection or a roadway segment. The collision diagram produced by ACDS, by virtue of its represen-
tation of each accident by a single symbol and its color
of accident severity, produces better results and provide
insight into accident experience at a location than do
systems that produce only one symbol for each type of ac

by David M. Litvin; Tapan K. Datta
Goodell-Grivas, Inc., Southfield, Mich.; Wayne State Univ.
Detroit, Mich.
Publ: HS-027 292 (TRR-706), "Simulation Technology an
Traffic Accident Records Systems," Washington, D.C., 1
p23-7
1979 ; 4refs
Prepared for presentation at 58th annual meeting of the
Transportation Res. Board. Includes discussion by John J.
Zogby and authors' closure. Research sponsored by Traffi
Improvement Assoc. of Oakland County, Mich.
Availability: In HS-027 292

HS-027 297

COMMERCIAL VEHICLE ACCIDENT FACTOR

A 12-month study of commercial vehicle accidents in Ca
was conducted to establish and evaluate appropriate da
development procedures and statistical analysis techniqu
to derive inferences about accident causation and the p
for possible countermeasures. As an extension of an earlie
covering 925 collision reports this study involved 2097 a
al reports from the same study areas of Sacramento, a
Angeles. The characteristics of the sample and the form
procedures used in data collection and reduction are
rized. Selected results of univariate analyses are summ
under four categories: accident factors, involved com
vehicle factors, non-commercial vehicle factors, and hum
tors. A selected set of cross tabulations exhibiting joint f
cies of certain combinations of variables are reported. A
is described which explains or predicts the occurrence o
cle jackknifing as an accident cause by incorporating all
individual two-way interactions between jackknifing bef
cident and road surface, lockup, and number of drive
Results of contingency table analyses are presented, relat
occupant injury severity to road type, truck type, and
weight; brake-related accident to vehicle category an
direction; and commercial vehicle accident to vehicle con
tion, weight, and exposure. Vehicle exposure was found
important in explaining accident occurrence, though not
portant as configuration and weight. Areas for future st
recommended.

by G. A. Fleischer
University of Southern California, Traffic Safety Center,
Angeles, Calif.
Publ: HS-027 292 (TRR-706), "Simulation Technology an
Traffic Accident Records Systems," Washington, D.C., 1
p28-36
1979 ; 6refs
Prepared for presentation at 58th annual meeting of
Transportation Res. Board. Sponsored by National Hwy.
Traffic Safety Administration.
Availability: In HS-027 292

HS-027 298

ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMP SIMULATION

Computer simulation models were developed to anal
delay to bicycles and motor vehicles at crossings and i
tions where the two types of vehicles interact. The o
was to generate some understanding of the level of d

each type of vehicle under various methods of traffic control and combinations of traffic conditions. Observational experiments on bicycle traffic behavior and interactions between bicycles and motor vehicles were carried out in the field, and the models were structured based on these data. The simulation models gave a fairly good representation of delays at intersections and crossings under various methods of traffic control, but the models cannot establish appropriate criteria and warrants for selecting traffic controls. Values and other subjective bases play an essential role in determining the trade-offs between delays for bicycles and for motor vehicles, and between safety and efficiency. The simulation data can provide a quantative basis for exploring standards.

by Thomas C. Ferrara; Tenny N. Lam
California State Univ. at Chico, Dept. of Civil Engineering;
University of California, Davis, Dept. of Civil Engineering
Publ: HS-027 292 (TRR-706), "Simulation Technology and Traffic Accident Records Systems, " Washington, D.C., 1979 p36-44
1979 ; 7refs
Prepared for presentation at 58th annual meeting of Transportation Res. Board. Sponsored in part by Federal Hwy. Administration.
Availability: In HS-027 292

HS-027 299

STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS

Severe problems faced by the states in financing their transportation programs in the 1970's are examined, including a review of current methods of financing and potential sources of revenue. The highway user tax system, individual highway user charges, and state tax systems are discussed, as well as findings and suggestions. Statistical data are appended to illustrate trends and variations in financing practices among the states. Reasons for the state transportation financing crisis include: a revenue base not responsive to inflation, a relative slowdown in motor fuel consumption (principal source of revenue), soaring costs, greater sensitivity to social and political pressures, and increasing demands for transportation facilities and services. Motor vehicle fuel efficiency improvements and conversion to new energy sources will worsen the situation. The dedication of highway funds has tended to isolate highway financing from the mainstream of policy making. The highway user charge system has fallen prey to inflation. There is no hidden revenue fountain to rescue the states, but appropriate revenue levels can be achieved by current financing methods. A diverse state and local tax structure tends to minimize tax competition among jurisdictions. Revenue issues pertain mainly to the distribution of the burden. A judicious combination of general tax subsidy and total benefit financing might promote equity and minimize excess burden. An institutional framework that will facilitate adjustments in the revenue structure appears necessary.

by Thomas L. Copas; Herbert A. Pennock; Gay I. Leslie, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. NCHRP-Synthesis-62 ; 1979 ; 44p 17refs
Sponsored by American Assoc. of State Hwy. and Transportation Officials in cooperation with Federal Hwy. Administration. Based on "State Transportation Financing in the 1970s: Theory and Practice," by Richard M. Zettel.
Availability: TRB $5.20

HS-027 300

DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES

The design of a rapid warm-up glow plug thermal control system for General Motors' diesel cars is described. The new system attains glow plug operating temperature in about 6.5 sec, compared to 60 sec for its predecessor. The system design is based on feedback control of a thermal model of the glow plugs. As used in 1979 GM vehicles, the system not only provides an order of magnitude reduction in preglow time, but actually decreases the total energy input required from the battery. The system comprehends vehicle voltage, rendering the glow plugs immune to temperature variations as a function of voltage. These features should give the diesel engine wider public acceptance by reducing the difference in starting practice between spark ignition and diesel engines. Appended is the derivation of the modeling equation.

by Arthur R. Sundeen
General Motors Corp., Oldsmobile Div.
Rept. No. SAE-790208 ; 1979 ; 11p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 301

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS

The Couette viscometer is described for measuring the viscosity of engine lubricants. A novel feature of the instrument is an electrical capacitance method for determining the size of the annular gap. The heat generation rate in the viscometer can be minimized by making the annular gap small. The device allows one to avoid the use of high pressure and to apply a uniform shear rate. The main technical difficulty involves uncertainties about dimensions of the annular gap. The gap may be uneven due to problems in machining cylinders to fine tolerances; it may fluctuate during measurements because of inner cylinder wobbling and/or eccentric motions; it may increase due to service wear; and it may be affected by sample injection pressure and temperature changes. Operating procedures (steady and stop-start running) are detailed, and mathematical corrections are established for dealing with temperature rise in the test sample. Viscometric data are presented for both single-grade and multigrade oils.

by B. Wright; J. Mather
Shell Res. Ltd., Thornton Res. Centre, Chester, England
Rept. No. SAE-790212 ; 1979 ; 15p 16refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 302

ROADWAY-DRIVER COMPATIBILITY

The motor vehicle transport system is examined in relation to safety and human behavior. Historically, only two events reversed the yearly traffic casualty rate. The first was gasoline rationing and a 45-mph speed limit during World War II. The secnd was the 55-mph speed limit to conserve energy. Traffic control on streets and highways must recognize the safe stopping sight distance (SSSD) concept defined by the American Assoc. of State Hwy. Officials. Problems in providing a SSSD pertain to the time needed by drivers for perception and reaction, condition of road surface where an emergency stop occurs, erroneous assumption that heavy trucks and automobiles can operate with the same SSSD, and assumption by highway authorities that all brake and tire systems respond instantaneously to driver input. Roads and streets can be improved by universal adoption of the SSSD as a standard. Intersections can be carefully designed and controlled to minimize accidents. Understanding driver capability is vital at these locations. Even intersections with a 90-degree configuration create impossible visual conditions for many drivers. Railroad grade crossings are specialized intersections where trains and motor vehicles conflict. Apparent restrictions in roadway width require driver recognition and improved traffic control. No-passing zones are intended to aid the driver when evaluating safe passing sight distances relative to road configuration. The 55-mph speed limit has reduced traffic casualties by adjusting vehicle speed to a rate compatible with human control, but a primary fault of the motor vehicle transport system is the lack of time allotted for drivers and vehicles to respond appropriately to an emergency situation or normal traffic control directives.

by George W. Brown; Brent O. Bair
Oakland County Road Commission, Mich.
Rept. No. SAE-790298 ; 1979 ; 7p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 303

ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS

High-temperature permanent and temporary viscosities of oils run in a diesel injector shear stability test (DISST) were compared with similar data for two European laboratory engine tests (Peugeot 204 Shear Stability Test; Cortina High Temperature Test), and tests on a High Shear Rate Capillary Viscometer developed by Texaco. A field test was also conducted. Four multigrade oils were used that differed in the polymer thickener and the ratio of base oils used. Measurements of engine oil viscosity at high shear rates and high temperatures provided a more useful characterization than standard viscosity measurements at 100 degrees C and low shear rates. Shear stability and low shear rate viscosity measurements did not permit adequate assessment of engine oil shear stability. It was found that temporary viscosity losses can be larger than permanent viscosity losses and can be more dominant in determining engine viscosity, that temperature effects on polymer thickening ratio are important in determining engine oil viscosity, and that permanent and temporary viscosity losses in the DISST and comparable mechanical shear stability tests have promise as a means of evaluating the shear stability of oils under conditions similar to those in the engine. Additional information on test procedures and results is appended.

by E. W. Spooren; S. W. Rein; D. L. Alexander
Texaco Inc.
Rept. No. SAE-790214 ; 1979 ; 17p 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 304

DURABILITY OF DECORATIVE ELECTROPLA
PLASTICS FOR EXTERIOR AUTOMOTIVE USI
REVIEW

Interrelationships among resin, part design, molding p
preplate process, and electroplate structure are addresse
their effect on the part durability of electroplated pla
exterior automotive environments. The expanded use of e
plated plastics calls for a review of technology to avoid
plication, improper design, and unrealistic or inadequa
specifications. Electroplating of plastic parts generally in
tensile strength, elastic modulus, flexural strength, and h
tortion temperature and reduces the coefficient of ther
pansion for the resulting composite. Ductility, measured
sile elongation, and impact strength of the composite are
ly reduced. Resistance of plastic to ultraviolet-induced
and abrasion is dramatically improved with electroplati
metal deposits become thicker, load-bearing properties
composite become more like those of metal. Properly
electroplated plastics produce lightweight, complex, lo
and durable parts, with a lustrous chromium finish that en
the appeal and marketability of automobiles. Plastic resin
cal and tensile properties, resin thermal cycle perfor
molding machines and conditions, behavior of the metal-
bond, catalysis and metal deposition, effect of metal pro
on part durability, chemical properties of metals, and ch
reactivity of the electroplate are detailed.

by Douglas A. Thompson
Shipley Co., Inc., Newton, Mass.
Rept. No. SAE-790215 ; 1979 ; 12p 69refs
Presented at Congress and Exposition, Detroit, 26 Feb-2
1979. Based on review article, "Durability and Structure
Electroplated Plastics," by Richard G. Wedel.
Availability: SAE

HS-027 305

ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS

Increased use of plastics to reduce automobile weight
finishing process for plastic parts are examined. Plastic
nents of automobiles include front-end panels, grilles,
housings, fan shrouds, fender liners, instrument panels,
lamp housings, interior trim components, air conditioni
tems, and truck cabs. Major categories of plastics are a
trile-butadiene-styrene, polyethylene, polypropylene, ny
berglass-reinforced plastics, polycarbonate, polyph
oxide, reaction injection molding, sheet molding compou
bulk molding compound. Organic coatings used in the f
process for plastic parts must adhere to the substrate
destroying desirable plastic properties. Factors such
temperature of coating, heat distortion temperature of
crazing, embrittlement, and adhesion must be con
Common paint systems include urethanes, epoxies, l
water-reducible systems, and high solids. Under Enviro
Protection Agency regulations, desired coatings will ten
high solids or water.

by R. R. Koch; Eric Pelfrey
Automotive OEM; Sherwin-Williams Co., Chemical Coa
Div.
Rept. No. SAE-790216 ; 1979 ; 8p
Presented at Congress and Exposition, Detroit, 26 Feb-2
1979.
Availability: SAE

HS-027 306

FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT

Advanced testing and analysis techniques to improve vehicle vibration performance are considered, with reference to modal analysis and building block technology based on minicomputer software, developed by Structural Dynamics Res. Corp. Narrow band spectrum analysis, modal testing, and building block simulation are widely used by the automotive industry for vehicle ride improvement. A four-step procedure being employed on the DeLorean luxury sports car is proposed to enhance the vibration performance of prototype and/or production vehicles. The procedure includes operating (road) tests, artificial excitation tests, modal analysis, and system design analysis. Examples of the procedure's application show how test engineers can identify and evaluate solutions to vehicle vibration problems using a minicomputer-based hardware-software system in the laboratory. Photographs, illustrations, and test data are included.

by Jack W. Martz; Edward L. Peterson; Gerald W. Knobeloch; G. D. Angus
Structural Dynamics Res. Corp., Milford, Ohio
Rept. No. SAE-790219 ; 1979 ; 16p 6refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 307

PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS

Parameter estimation techniques are presented that can be used to determine modal parameters (frequency, damping, and mode shape) from experimentally-measured frequency response or unit impulse response. The methods are separated into two categories: curve fit of only one degree of freedom, with or without residuals; and curve fit of multiple degrees of freedom, with or without residuals. Parameter estimation algorithms for determining a structure's modal characteristics are given. Particular attention is paid to multiple degree of freedom techniques utilizing a complex exponential algorithm. Limitations of parameter estimation techniques are noted.

by D. L. Brown; R. J. Allemang; Ray Zimmerman; M. Mergeay
University of Cincinnati, Ohio; Katholieke Universiteit te Leuven, Belgium
Rept. No. SAE-790221 ; 1979 ; 22p 14refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 308

LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979

Data on the 1979 automotive fleet's fuel economy are presented and compared with data for the 1978 fleet on the basis of projected sales for those two years. Three Environmental Protection Agency (EPA) fuel economy values are measured: city, highway, and combined city and highway. To evaluate the combined value, data on sales distributions of cars in varied weight classes were obtained for model years 1958 through 1979. Fuel economy data were based on the carbon balance measurement method. Detailed analysis showed that fuel economy of the 1979 fleet was 41.5% better than in 1974; 23.2% of this improvement derived from technology advancements and the rest came from weight mix improvements. From 1978 to 1979, there was a 2.8% net gain in fleet mpg, with engine mix and weight mix shifts contributing a 5.2% increase and system optimization a 2.3% loss. About half of the loss appeared related to 1979 changes in dynomometer road load settings. The fuel economy of California cars improved in 1979 at the fleet level. In general, average vehicle interior volume was not sacrificed for fuel economy gains. The achievement of mpg standards promulgated by the EPA through 1985 appears feasible with gasoline-powered vehicle technology and low sales fractions for diesel-powered vehicles. Data on sales of passenger cars and light-duty trucks are appended.

by J. D. Murrell
Environmental Protection Agency
Rept. No. SAE-790225 ; 1979 ; 32p 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 309

IN-SERVICE FUEL ECONOMY

In a Ford Motor Co. survey of management personnel who drive company-leased vehicles, in-service fuel economy data were computed on approximately 10,600 cars from the 1978 model year. Winter and summer surveys were conducted, and relationships and trends in fuel economy data were analyzed. Results showed that the ranking of different cars by Environmental Protection Agency (EPA) urban, highway, and metro highway fuel economy ratings compares well with Ford's in-service fuel economy rankings. The percentage difference between in-service and ratings developed by the EPA is relatively constant with the level. The difference is also relatively constant for different vehicle classes. A wide range of fuel economies is indicated for each car line-engine-transmission combination, reflecting a wide range of driving habits and operating conditions. In-service fuel economies of cars with manual transmissions are somewhat closer to EPA ratings than cars with automatic transmissions. No significant trend by car size class is demonstrated in the relation between in-service fuel economy and metro highway fuel economy ratings. Survey data are tabulated.

by N. E. South; R. Raja
Ford Motor Co., Environmental Res.
Rept. No. SAE-790227 ; 1979 ; 16p 9refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 310

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY

The Dept. of Energy's Heat Exchanger Technology (HET) program and component projects are described. The Energy Res. and Devel. Administration sponsored a 1976 survey to identify deficiencies in HET affecting the development, demonstration, and commercialization of advanced energy recovery and conversion systems. This survey established a need for the HET Program and delineated four types of heat exchanger deficiencies: performance and reliability penalties inflicted by the heat exchanger environment (i.e., fluids in contact with the heat exchanger); design and construction of efficient and reliable high-temperature heat exchangers (material temperatures exceeding 1800 degrees F); poor economics in recovering low-grade waste heat; and lack of information on the long-term performance and reliability of newly-developed heat exchangers. Although HET projects relate directly to coal technology needs, the primary focus is on energy conservation and technology needs appropriate to the Department's Office of Conservation and Solar Applications. Each HET project in the following four categories is described and its progress summarized: environmental effects on heat exchanger performance; high-temperature heat recovery; low-temperature heat recovery; and test/evaluation of improved heat exchangers.

by W. Thielbahr; M. Perlsweig
Naval Weapons Center; Dept. of Energy
Rept. No. SAE-790250 ; 1979 ; 45p 10refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 311

IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES

Based on data generated by Volkswagen (VW) this paper reports on the special aspect of the impact which emission standards have on fuel economy and consumer attributes. It was found that the engineering goal to meet 1981 Federal emission standards would have to be 0.2, 1.7, and 0.25 gpm for hydrocarbons, carbon monoxide, and nitrogen oxides, respectively. The engineering goal to meet the 1981 research standard would have to be 0.2, 1.7, and 0.1 gpm. Advanced technology to achieve fuel economy was developed and tested using the VW Rabbit. Consumer attributes of interest were startability and drivability, performance, engine volume and weight, and cost. Introduction of K-Jetronic fuel injection with a closed loop system for compliance with 1981 Federal standards resulted in good economy, low unregulated emissions, low noise emissions, and good driving characteristics (drivability and performance). The fuel injection-closed loop system, however, increased engine cost by 60-70%. Fuel economy deteriorated with the research standard of 0.4 gpm nitrogen oxides.

by H. Oetting
Volkswagenwerk AG, Federal Republic of Germany
Rept. No. SAE-790230 ; 1979 ; 14p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 312

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)

A vehicle incorporating various fuel economy improvements and an electronically programmed engine control (EPEC) system is described. Fuel economy improvement features combined in this vehicle are road load horsepower (HP) requirement reduction; engine parasitic loss reduction; engine efficiency - emission control system; and automatic transmission loss reduction. Vehicle coast-down tests showed the reduction in road load friction HP requirements on the EPEC vehicle affect the shape of the road load horsepower curve as well as the 50 MPH set point. An electric vehicle dynamometer was required to match these curves at more than one speed. The total EPEC system provided a fuel economy improvement of 12.5% over the baseline comparison vehicle on the combined city and highway tests while also meeting the lower 1981 emission lev
low mileage. Fuel economy benefits of the combined s
and individual components are evaluated.

by Bruce D. Lockhart
General Motors Corp.
Rept. No. SAE-790231 ; 1979 ; 8p 4refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 M
1979.
Availability: SAE

HS-027 313

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY I VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS

Sources of variability in vehicle exhaust emission and fuel
omy measurements were studied in an extensive test pr
conducted by Ford Motor Co. The test program was de
using four vehicles on five CTE-50 Clayton Dynomo
cells. Four repeats for each vehicle-cell combination wer
vided, for a total of 80 CVS-C/H emission and fuel ec
tests. During testing, 23 variables were monitored and re
in real time. Nine other variables were also observed, for
of 32 variables (5 vehicle-related, 16 engine-related, 4 dy
meter, 3 driver-related, and 4 environment variables). The
sion deterioration factor, defined as the ratio between the
sion level of a given vehicle system at 50,000 miles to
4,000 miles, was analyzed. Selective enforcement audit, ce
tion, and correlation tests were performed. The vehicle
major contributor to emission variability while dynamo
driver, and gas analyzer seemed to be more important
economy variability. Instruments developed for on-line d
cording, software for off-line data processing, and sta
analysis techniques used to identify and quantify sour
variation are described. Benefits resulting from reduce
variability are discussed, i.e., lower test cost due to im
test efficiency and increased confidence in results. Data
drocarbon, carbon monxide, and nitrogen oxide emissio
presented.

by Narenda J. Sheth; Timothy I. Rice
Ford Motor Co., Test Operations and Engineering Servic
Rept. No. SAE-790232 ; 1979 ; 36p 3refs
Presented at Congress and Exposition, Detroit, 26 Feb-2
1979.
Availability: SAE

HS-027 314

COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM

An interactive computer-aided program for predicting t
formance of a total diesel engine manifold system is exa
Basic program modules are power (in-cylinder calcul
valve (cam and valve gear design), manifold (manifold
including turbine nozzle), and graphics (plotting of result
program was evaluated using test data supplied by a com
user. Results show that the program can be used for th
gas dynamic and thermodynamic design of a turboc
diesel engine. The program is accessed via visual displa
and its interactive nature takes many activities from the r
a research department into that of a design department.
are validated by comparison with a well-known wave
program.

by S. C. Low; R. S. Benson; D. E. Winterbone
University of Manchester, Inst. of Science and Tech., Manchester, United Kingdom
Rept. No. SAE-790277 ; 1979 ; 18p 20refs
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 324

AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA

The relationship was investigated among four dependent and seven independent variables reflecting the accident problem in American Samoa between July 1974 and April 1977, in order to isolate effects of the Selective Traffic Enforcement Program (STEP) and its impact on the number of accidents. Dependent variables were the number of traffic fatalities, accidents, injury accidents, and injuries resulting from traffic accidents. Independent variables included the number of citations issued, inches of rainfall, gasoline sales, alcohol sales, traffic violation convictions, and overall effect of time (in months). Statistical analysis was employed to analyze relationships among variables. Variables correlating to accidents and STEP at the 0.05 level of significance were subjected to stepwise regression analysis. With accidents as the dependent variable, four potentially significant independent variables were quantified from correlation analysis: alcohol sales; STEP; time; and publicizing names of persons convicted of traffic violations. Subsequent regression analysis revealed that the STEP did not significantly affect accident reduction. Time had a strong impact on accidents, as well as the "publication" variable. Additional study is recommended focusing on more variables and the question of whether to classify American Samoa as a developing country. Also recommended is an extension of the study period and an investigation of accident patterns in areas with cultural and economic conditions similar to American Samoa. A review of related literature is included, and supplementary data are appended.

by M. A. Leach
Office of Traffic Safety, American Samoa
1978 ; 87p refs
Availability: Corporate author

HS-027 325

EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS

Automobile and truck engine emission standards proposed by the Environmental Protection Agency (EPA) are criticized. Already in violation of the Clean Air Act, EPA is proposing carbon monoxide (CO), hydrocarbons, and nitrogen oxides standards that will be impossible to meet. According to the Motor Vehicle Manufacturers Assoc., new selective enforcement audit regulations are more stringent for trucks than for cars. Ford and General Motors are working to meet existing standards but with little success. General Motors estimates that meeting the CO standard will increase the price of cars by $30 to $40. EPA's proposed standards for diesel-powered cars and light-duty trucks are 0.6 gpm in 1981 and 0.2 gpm for 1983 and beyond. Many government and industry officials feel that EPA is not addressing the ambient air quality issue or evaluating the economic cost of proposed emission standards.

Publ: Government Executive v11 n10 p32, 34-5 (Oct 1979)
1979
At head of title: Air Pollution Highlights
Availability: See publication

HS-027 326

NEW AND IMPROVED ELASTOMERS FOR AUTOMOTIVE USES

Future requirements for modified polymers to meet automotive design needs are outlined. Two particularly important properties of synthetic rubber are heat and oil-solvent resistance. These properties are primarily needed in automotive applications under the hood, i.e., engine compartment, drive train system, fuel, and emission systems. Most of the new elastomers and improved polymers are designed to improve these properties while maintaining tensile strength, abrasion resistance, low temperature flexibility, and elongation. Constant elastomer upgrading is reflected in Viton fluorocarbon elastomers, which are becoming the elastomer of choice in the fuel system where low vapor permeability, "sour" fuel resistance, and the ability to tolerate gasoline-alcohol blends (gasohol) are becoming critical. Improved polyacrylates with new cure technology are being introduced that exhibit a better compression set and better heat resistance over previous polymers. Dow Corning has announced a high vinyl silicone with improved toughness and flex life for automotive sealing applications. New candidate polymers introduced by the synthetic rubber industry include Norsorex PNR, manufactured in Europe and introduced in the United States by American Cyanamid; F-70 vulcanizable elastomer introduced by American Cyanamid; Vamac, an ethylene/acrylic elastomer marketed by DuPont; two fluoroelastomers, Kalrez and Firestone's PNF 200 phosphonitrile; and a thermoplastic copolyester know as Hytrel.

by J. R. Pailthorp
Publ: Elastomerics v111 n10 p50-3 (Oct 1979)
1979 ; refs
Presented at a meeting of the International Inst. of Synthetic Rubber Producers, Inc., Vancouver, B.C., Canada, 20-25 May 1979.
Availability: See publication

HS-027 327

ELASTOMERS IN DETROIT: STATE OF THE ART, 1980. SPECIAL REPORT

The role of elastomers in the automotive industry's vehicle weight reduction program is considered. The mandate for improved fuel efficiency, pressures for improved damageability and occupant safety, the need to comply with emission regulations, and the desire to provide consumers with a "big car ride" are causing conflict in Detroit. The automotive industry must play a major role in vehicle weight reduction. Weight reductions to achieve an auto fuel efficiency of 27.5 mph by 1985 will center on replacing traditional construction materials with lightweight substitutes such as elastomers. Steel, zinc, and ferrous castings will give way to polymeric replacements. General Motors engineers expect the plastic content of vehicles to increase from 175 lb/car in 1978 to 225-300 lb/car by 1985. Trends in the use of elastomers are reviewed (sheet molding compound, reaction injection molding, reinforced reaction injection molding, adhesive bonding, and tire sealing). Experimental work on the use of carbon fiber (graphite) reinforcement for auto parts is reported and the use of elastomers by Ford and General Motors is discussed. Attached are chronological tables of elastomers' automotive introduction (1968-1977), and estimated plastic usage (1975-1985) by type.

by W. O. Murtland
Publ: Elastomerics v111 n10 p41-5, 48 (Oct 1979)
1979 ; 14refs
Availability: See publication

HS-027 328

HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE

General Motors is the first automotive manufacturer to issue an improved performance fuel hose specification. The GM-6165M specification requires a heat-resistant nitrile rubber (NBR) tube with polyester cord reinforcement and a chlorosulfonated polyethylene jacket. Compounding techniques were explored in order to develop an NBR hose that would meet performance requirements of the specification. A 28% acrylonitrile bound antioxidant NBR was used, filled with a low-sulfur zinc oxide-activated cure system. It was determined that expensive and potentially toxic cure additives such as cadmium oxide are feasible but not recommended. Testing of the fuel hose involved heat aging, plasticizer screening, and sour gasoline performance evaluation. Results showed the GM-6165M specification significantly upgrades the performance of NBR-based automotive fuel hoses.

by James W. Horvath
Publ: Rubber Chemistry and Technology v52 n4 p883-94 (Sep-Oct 1979)
1979 ; 10refs
Presented at meeting of the American Chemical Society's Rubber Div., Atlanta, 27-30 Mar 1979.
Availability: See publication

HS-027 329

ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS

Activity spaces and related travel behavior of four campus groups at the University of Illinois (Urbana-Champaign) were studied. Of 2,127 travel diary forms returned in the fall of 1974, 2,007 were complete enough for data analysis, which determined that 66% of all moves were on foot, 15% on bicycle, and 19% by automobile. Four aspects of travel behavior (number of trips, trip length, trip mode, and trip purpose) were examined using four campus groups (lower division students, upper division students, graduate students, and faculty-staff). It was hypothesized that travel behavior and activity spaces would vary significantly among these groups due to different residency requirements, access to automobiles, work and class schedules, and time budgeting for nonessential activities. Significant and consistent differences were observed among the groups. Activity spaces and travel options were severely constrained by work and class schedules. Changes in class breaks, class schedules, and use of major travel routes were also important. The study resulted in specific suggestions to ease local conflicts and congestion (specific routing suggestions for certain intersections, closing of some streets to motor vehicles, reallocation of classes to underused buildings, and additional bicycle parking facilities), and general suggestions to reduce overall traffic confusion (changing class schedules, staggering work hours, separating on- and off-campus traffic, extending bicycle network). The effort of university administrators to lessen dependence on automobiles is noted. Activity space and travel behavior models are discussed.

by John V. O'Loughlin
Publ: Traffic Quarterly v33 n4 p525-38 (Oct 1979)
1979 ; refs
Sponsored by Univ. of Illionis Res. Board.
Availability: See publication

HS-027 330

EFFECT OF RECREATIONAL VEHICLES ON HIGHWAY SPEED

A relationship among recreational vehicle (RV) speed,
flow, and traffic composition is developed, based on da
lected by the Wisconsin Dept. of Transportation duri
1977 Memorial Day weekend on two interstate highways.
cle spot data were aggregated into 100 five-minute peri
functional model related average spot speed to present a
values of traffic flow and traffic composition. A distribu
model related average spot speed to lagged average spot
and present and past values of traffic density and comp
Vehicle types observed on the four-lane highway test
included cars or pickups towing trailers, pickups with c
or van conversions, motor homes, school buses, inner-city
single-unit trucks, semitrailers or single-unit trucks pullin
ers, cars, pickups, and vans. RV's had the impact on hi
speed of 1.315 passenger cars at 1,200 vehicles per hour
only 1.063 passenger cars at 3,000 vehicles per hour.
findings suggest that aggregate benefit estimation techniq
likely to contain biases when applied to facilities with sig
proportions of RV traffic, when RV's are not accoun
separately. Further study is recommended to incorpor
results into investment analysis packages of planning a
which deal with rural highways in recreational areas.
flow-density relationships are examined.

by Donald J. Harmatuck
Publ: Traffic Quarterly v33 n4 p539-53 (Oct 1979)
1979 ; refs
Availability: See publication

HS-027 331

PUBLIC TRANSPORTATION AND THE TRAVE NEEDS OF WOMEN

The impact of Federal, state, and local public transp
policies on women is assessed. Public transit is an import
of the transportation network, and personal mobility is
function of this network. Since travel patterns reflect a
in which people engage or individual lifestyles, it can be
ed that travel patterns and preferences for men and
differ. Studies of women's travel behavior indicate that
use public transportation more than men by a 2-1 ratio
transit users in general have low income and employmen
and do not have access to an automobile. Two public
innovations appear to hold promise for women, demand-
sive transit and exclusive lane busways (commuter serv
collects passengers from suburban stations and then tr
downtown area destinations via a reserved freeway lan
gestions for additional research focus on transportation
women, the role of public transit in providing access to
ment, and how transportation policies affect women.

by Genevieve Guiliano
Publ: Traffic Quarterly v33 n4 p607-15 (Oct 1979)
1979 ; refs
Availability: See publication

HS-027 332

FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY

A modeling procedure is presented which, when combined with an appropriate macroeconomic simulation model, provides accurate projections of the automobile population by model year, automobile survival rates, and average annual automobile fleet fuel efficiencies. In forecasting fuel efficiency, the modeling procedure considers impacts of prevailing economic conditions, governmental policy decisions regarding new vehicle fuel efficiency standards, and automobile usage characteristics. Major components in determining the number of automobiles in use by model year are new car sales, automobile ownership and automobile survival rates. Fuel efficiency calculations show a 35% increase during the 1979-1990 period. Average fuel efficiencies, if combined with stabilized automobile usage, will generate a significant reduction in total highway fuel consumption.

by Fred L. Mannering; Kumares C. Sinha
Publ: Traffic Quarterly v33 n4 p637-48 (Oct 1979)
1979 ; refs
Sponsored by the Joint Hwy. Res. Project of Purdue Univ. and Indiana State Hwy. Commission.
Availability: See publication

HS-027 333

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT

Tests were conducted to measure the effect generated by high-voltage transmission lines with and without supervisory carrier signals on the performance of typical LORAN-C receivers having potential use in land vehicle applications. LORAN-C is a highly accurate ratio-navigation system originally developed for the Department of Defense and subsequently designated for marine use in the coastal and confluence zone. Tests were performed on high-voltage transmission line configurations owned and operated by the Tennessee Valley Authority. Transmission lines were assessed with 60 Hz power impressed and absent and carrier signals impressed and absent. Data were plotted for three secondary time differences along the East Coast. Signal-to-noise ratios for secondaries as well as the master were recorded. The test area had extremely good LORAN-C signal coverage. With the carrier off and the line de-energized, acceptable receiver performance was obtained to within approximatey 100 meters from the line center. With the line energized, usable performance degraded to a point about 200 meters. With asynchronous carrier signals, performance was unreliable at distances less than about 300 meters. Receivers would not operate properly at 1,000 meters either side of the line with synchronous interference. Test data and the LORAN-C receiver test data sheet are appended.

by Peter G. Mauro; John D. Gakis
Transportation Systems Center, Cambridge, Mass. 02142
Rept. No. DOT-TSC-RSPA-79-8 ; 1979 ; 172p 4refs
Rept. for May - Jul 1979.
Availability: NTIS

HS-027 334

ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT

Accident statistics for weekday, weekend, and holiday periods for the 1973-1976 period were analyzed by the Kentucky Dept. of Transportation's Div. of Res. Accident rates were computed for the rural highway system and its three major components: two-lane and three-lane roads; four-lane roads; and expressways (interstate highways, parkways, and toll roads). On rural roads, the largest numbers of accidents occurred on Saturdays, Fridays, and Sundays, respectively. Tuesdays generally had the lowest number of accidents. Highest accident rates for two-lane roads were on Sundays and Saturdays, and rates for expressways were highest on Sundays. Accident rates on weekends were substantially higher than on weekdays. Rates for fatal and all accidents were lower during holiday periods than during weekends not involving holidays. Holiday periods had fewer accidents per day than weekends but had more accidents per day than weekdays. Traffic during holidays, however, was significantly greater than on weekends or weekdays.

by Jerry G. Pigman; Rolands L. Rizenbergs; Donald R. Herd
Kentucky Dept. of Transportation, Lexington Div. of Res., 533 S. Limestone, Lexington, Ky. 40508
KYP-75-73
Rept. No. PB-295 690; RR-513 ; 1978 ; 27p 2refs
Availability: NTIS

HS-027 335

A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT

A three-part critical review of literature concerning problem drinking behavior in special population groups is summarized. A nine-step research strategy was developed to identify, locate, and assess the needs of special population groups in order to improve delivery of alcoholism treatment and prevention services. A general survey and bibliography of literature associated with the problem drinking behavior of special population groups was compiled. Particular attention is paid to the Spanish-speaking population group. Other major headings in the population group typology are general, institutionalized, ethnic/racial/religious, black, Native American, socioeconomic status, occupation, age (youth, elderly), family, and female. The literature encompasses studies published from 1965-1977.

by Douglas C. Hall; Madeleine Waldmann; Barrie Piland; Kathleen Chaiken
Stanford Res. Inst., Menlo Park, Calif. 94025
ADM-281-76-0025
Rept. No. NIAAA/NCALI-79-09; SRI-URU-5580-Vol-1; PB-296 501 ; 1977 ; 9p
Vol. 2, Research Strategy is HS-027 336.
Availability: NTIS

HS-027 336

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT

A research strategy is described for a critical review of the literature on the improvement of alcoholism treatment and prevention service delivery to persons within special population groups who have drinking problems. Nine steps comprise the strategy: identify population groups; locate population groups; determine the extent of problem drinking within special groups; determine treatability and preventability aspects of problem drinking with special population groups; designate high-priority service delivery targets; designate high-priority research targets; designate low-priority service delivery targets; designate low-priority research targets; and identify intermediate priority service delivery and research targets. Overall, the research strategy specifies an approach to organizing information about special population groups, their drinking characteristics, and the nature of treatment-prevention services.

by Douglas C.Hall
Stanford Res. Inst., Menlo Park, Calif. 94025
ADM-281-76-0025
Rept. No. NIAAA/NCALI-79-10; SRI-URU-5580-Vol-2; PB-296 502 ; 1977 ; 25p
Vol. 1, Executive Summary, is HS-027 335.
Availability: NTIS

HS-027 337

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA

The impact is assessed of fuel switching (from unleaded to leaded in catalytic converter-equipped vehicles) on increased photochemical smog levels observed in the South Coast Air Basin (SOCAB) of California. The use of leaded gasoline in automobiles equipped with catalytic converters deactivates the converters and leads to increased reactive hydocarbon emissions. A consistent long-term improvement in SOCAB ozone levels, much of which can be attributed to automobile emission controls, was reversed in the summer of 1978. The reversal was determined by data obtained for the Los Angeles basic portion of the SOCAB, adjusted for weather variations. Causes of misfueling were evaluated (shortage of unleaded gasoline due to high demands and low supplies, price differentials between leaded and unleaded gasoline, and performance degradation). Effects of misfueling on the ozone air quality were studied, as well as the effect of increased reactive hydrocarbon emissions on ozone concentrations. It was determined that the air quality in Southern California is being threatened by fuel switching. Economic, legislative, educational, and policy actions to avoid adverse impacts on public health and the economy are recommended.

by Thomas F. Heinsheimer; John S. Nevitt; Mike A. Nazemi
Publ: Journal of the Air Pollution Control Association v29 n10 p1064-6 (Oct 1979)
1979 ; 5refs
At head of title: APCA Notebook
Availability: See publication

HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT

The Wharton Automobile Demand Model can be used to make the following forecasts: size and composition by size-class of the "desired" (equilibrium) auto stock; new registrations, total and
by size-class; size, composition by class, and vintage distri
of actual auto stock; vehicle miles traveled by the fleet; n
size-class, and for the new and existing fleet, both Enviro
tal Protection Agency and actual driving mpg estimates
car base purchase prices, options expenditures, and tran
tion charges by size-class; and used car prices, by size-cl
vintage, and total used car transactions. The model can b
to analyze the impact of changes in the rate of family forr
in the distribution of families by size, and in the age an
graphic distribution of the population. The effect can be
ined of varying rates of real income growth, employme
inflation, and possible tax and pricing policies affecting pu
costs or operating expenses. The model also can be u
analyze the impact of changing curb weights and engi
placements, and of increases in fuel consumption eff
through technological advances or losses due to stricte
sions standards. Baseline forecasts through the year 20
presented, along with observed elasticities (multipliers) f
various exogenous variables as increases in gasoline pric
sonal income, various taxes and fuel efficiency.

by Colin J. Loxley
Wharton Econometric Forecasting Associates, Inc., 4025
Chestnut St., Philadelphia, Pa. 19104
DOT-TSC-1072
Rept. No. DOT-TSC-NHTSA-79-49-Vol-1; PB80-143316
; 164p refs
Rept. for Sep 1975-Mar 1977. Vol. 2, Simulation Analysis
HS-804 848; Vol. 3, Appendices, is HS-804 855.
Availability: NTIS

HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARK
MODELING OF THE LONG-RUN DETERMIN
OF THE DEMAND FOR AUTOMOBILES. VOL
SIMULATION ANALYSIS USING THE WHART
E.F.A. (ECONOMETRIC FORECASTING
ASSOCIATES) AUTOMOBILE DEMAND MOD
FINAL REPORT

The impact of four events or policies on the U.S. aut
market through the year 2000 was analyzed using the V
Automobile Demand Model which provides long-run
analysis and forecasting of annual trends for auto sto
sales, and their composition by auto size-class. The fir
scenarios fall into a "single shock" category: a 10%
price increase, a 1% personal income increase, and a 5
chase tax on large cars. The final simulation is a more c
"system" analysis of the impact of a 20% OPEC price
as against the 10% assumed for the baseline. Each simu
discussed and compared with the baseline forecast. T
data are appended.

by Colin J. Loxley
Wharton Econometric Forecasting Associates, Inc., 402
Chestnut St., Philadelphia, Pa. 19104
DOT-TSC-1072
Rept. No. DOT-TSC-NHTSA-79-49-Vol-2; PB80-16560
; 352p
Rept. for Sep 1975-Mar 1977. Vol. 1, Wharton EFA
Automobile Demand Model, is HS-804 847; Vol. 3, App
is HS-804 855.
Availability: NTIS

HS-804 855

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT

Documentation of data sources and methodology, a discussion of model equations, and exogenous assumptions are provided for the Wharton Automobile Demand Model which provides long-run policy analysis and forecasting of annual trends for U.S. auto stock, new sales, and their composition by auto-size class. The documentation of data sources and methods includes an overview of the data base, sources for basic data series, and size class definitions and methodology for determining model estimation data. The model equations include a review of the basic structure, cross-section equation estimates, translation to time-series, and time-series equation estimates (new registrations and scrappage, vehicle miles travelled, mpg, new and used car prices, and income distribution). All exogenous input data (demographic, economic, auto characteristic) used for baseline forecasts is presented, together with an indication of sources and methods used in their preparation.

by Colin Loxley
Wharton Econometric Forecasting Associates, Inc., 4025 Chestnut St., Philadelphia, Pa. 19104
DOT-TSC-1072
Rept. No. DOT-TSC-NHTSA-79-49-Vol-3; PB80-166580 ; 1979 ; 274p refs
Rept. for Sep 1975-Mar 1977. Vol. 1, Wharton EFA Automobile Demand Model, is HS-804 847; Vol. 2, Simulation Analysis, is HS-804 848.
Availability: NTIS

HS-804 912

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979

Reports from a three-day workshop on automotive repair and maintenance practices include opening and closing remarks; formal presentations on current Federal auto inspection, maintenance, and repair (IMR) programs; IMR issue papers; workshop sessions; and minority reports (i.e. written comments submitted on issues not addressed or felt to be inadequately considered at conference). Minor editing facilitated a comprehensive transcript of proceedings. Conference attendees (representing government, consumer groups, and industry) participated on one of five panels: standardization, equipment, inspection/diagnosis, consumer and self-help programs, and auto mechanic training. Each panel developed a list of five or more priority programs to be presented at the final working session. A priority ranking of the proposed programs by all participants indicated that programs directed at the auto mechanic and the consumer offer the greatest potential for resolving IMR problems. Several consumer panelists criticized apparent industry domination in the ranking process.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 123p
Includes HS-810 366. Sponsored by National Hwy. Traffic Safety Administration in cooperation with Transportation Res. Board.
Availability: NHTSA

HS-805 206

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT

A total of forty-five 1978 model year vehicles (passenger cars, pickups, multipurpose vehicles, and vans) were crash tested according to Federal Motor Vehicle Safety Standard No. 301 requirements. Each vehicle was subjected to one of two test modes: frontal impact into a fixed barrier at 29.4 plus/minus 0.5 mph, or rear impact by a 4000-lb moving barrier at 29.4 plus/minus 0.5 mph. The vehicle types, their test date and test mode are tabulated. Data for each vehicle are presented separately, including documentation of trajectory, residual crush, and tire marks. Representative post-test photographs of each vehicle are included.

by E. Enserink
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
DOT-HS-6-01478
Rept. No. DSI-3005-79-151/1505; PB80-146723 ; 1979 ; 354p
Rept. for Feb-Sep 1978.
Availability: NTIS

HS-805 207

SCHOOL BUSES. A BIBLIOGRAPHY

This bibliography represents literature acquired since the establishment of the National Hwy. Traffic Safety Administration (NHTSA) concerning the handling, operation, and safety of school buses. It is comprised of NHTSA contract reports, reports of other organizations concerned with highway safety, and articles from periodicals in related fields. Citations follow the format used in the monthly abstract journal, "Highway Safety Literature" (HSL) and are indexed by a keyword-out-of-context listing, author, corporate author, contract number, and report number.

by Lois Flynn, comp.
National Hwy. Traffic Safety Administration, Technical Reference Branch, Washington, D.C. 20590
Rept. No. SB-39; PB80-144124 ; 1979 ; 140p
Rept. for Dec. 1967.
Availability: NTIS

HS-805 212

OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT

A teardown study of the 1979 Oldsmobile Omega X-Body 4-Door Sedan was conducted to provide baseline data for the National Hwy. Traffic Safety Administration on material use, structure, and weight. The data will facilitate the assessment of the future potential of material substitution to achieve weight reduction and accompanying fuel economy improvement. The vehicle model has a 2.8-Litre, V-6 engine and an automatic 3-speed transaxle (front-wheel drive) transmission. A complete weight summary of the major vehicle components, a material distribution list, and photographs of the vehicle and engine-transmission-suspension assembly are provided. Parts lists are provided for the following assemblies: body, frame, front suspension, rear suspension, brakes, engine, transaxle assembly, fuel and exhaust system, steering system, wheels and tires, chassis electrical, cooling system, and bumpers and miscellaneous. Information in these lists includes component description, quantity per car, total weight per car, material description, method of fabrication, gauge thickness, and method of attachment. Photographs of major parts follow each list. Measurements are provided of selected body sections.

by Jerar Andon; Ronald Falk
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
DOT-HS-9-02111
Rept. No. PB80-145329 ; 1979 ; 125p
Rept. for Jul-Nov 1979.
Availability: NTIS

HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT

Experimental data were obtained in dynamometer tests of an 8-cylinder spark ignition 1977 American Motors 304 CID (cu-in-displacement) engine with a catalytic converter, exhaust gas recirculation, manifold preheated air inlet system, alternator (driven only, no output) exhaust air injection pump, and fan. The engine as equipped is intended for use in a 49-state (Federal) vehicle with automatic transmission. The testing was designed to obtain engine performance data for estimating fuel consumption and emissions (carbon monoxide, hydrocarbons, nitrogen oxides) for varied engine service and duty and to provide basic engine characteristic data required for the Transportation Systems Center Vehicle Simulator (VEHSIM) computer program. A test report and discussion of results are followed by tabular and graphical summaries of engine map data.

by Joseph Boziuk
Transportation Systems Center, Cambridge, Mass. 02142
NHTSA-PPA-HS027
Rept. No. DOT-TSC-NHTSA-80-10; PB80-155484 ; 1980 ; 47p
Availability: NTIS

HS-805 222

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT

Experimental data were obtained in dynamometer tests of an 8-cylinder spark ignition 1977 General Motors 350 CID (cu-in-displacement) engine with a catalytic converter, exhaust gas recirculation, manifold preheated air inlet system, alternator (driven only, no output) power steering pump, and fan. The engine as equipped is intended for use in a 49-state (Federal) vehicle with automatic transmission. The testing was designed to obtain engine performance data for estimating fuel consumption and emissions (carbon monoxide, hydrocarbons, and nitrogen oxides) for varied engine service and duty and to provide basic engine characteristic data required for the Transportation Systems Center Vehicle Simulator (VEHSIM) computer program. A test report and discussion of results are followed by tabular and graphical summaries of engine map data.

by Joseph Boziuk
Transportation Systems Center, Cambridge, Mass. 02142
NHTSA-PPA-HS027
Rept. No. DOT-TSC-NHTSA-80-11; PB80-170012 ; 1980 ; 48p
Availability: NTIS

HS-805 223

PERFORMANCE CHARACTERISTICS OF 197
CHRYSLER 318 CID (CUBIC INCH
DISPLACEMENT) ENGINE. FINAL REPORT

Experimental data were obtained in dynamometer test
cylinder spark ignition 1977 Chrysler 318 CID (cu-in
ment) engine with a catalytic converter, exhaust gas
tion, manifold preheated air inlet system, alternato
only, no output) exhaust gas aspirator, and fan. The
equipped is intended for use in a 49-state (Federal) veh
automatic transmission. The testing was designed
engine performance data for estimating fuel consum
emissions (carbon monoxide, hydrocarbons, and nitrog
for varied engine service and duty and to provide ba
characteristic data required for the Transportation
Center Vehicle Simulator (VEHSIM) computer progr
report and discussion of results are followed by ta
graphical summaries of engine map data.

by Joseph Boziuk
Transportation Systems Center, Cambridge, Mass. 0214
NHTSA-PPA-HS027
Rept. No. DOT-TSC-NHTSA-80-12; PB80-155336 ; 19
Availability: NTIS

HS-805 234

CONSUMER ADVISORIES OF THE NATION
HIGHWAY TRAFFIC SAFETY ADMINISTRA
1970-1979, WITH INDEX

During the period 1970-1979, the National Hwy. Traf
Administration issued over 180 news releases of speci
to consumers. These "consumer advisories" provided
tion with potential life-saving effect for the drivin
Motor vehicle and automotive product recalls, defects,
ards were announced. These releases are compiled
reference, in ascending order by date. A subject ind
vided (advisories referred to by date and number).

by Winifred F. Desmond, comp.
National Hwy. Traffic Safety Administration, Washing
20590
1979 ; 440p
Availability: NHTSA microfiche only

HS-810 366

VEHICLE DESIGN IS THE KEY TO LOW CO
MAINTENANCE AND REPAIR

Many maintenance and repair items can be virtually
through proper automotive design and construction (e
batteries that do not require addition of water, self
brakes). Better designs of automatic transmissions and
little or no service over vehicle life. Designs can in
diagnostic systems (e.g. brake warning light, service
systems) or can allow easy inspection (e.g. clear pla
voirs for brake fluid). By making inspection and
simple, car owners can judge whether repairs have
satisfactorily or they can do their own servicing. Dia
maintenance should be made as simple as possible to r
and improve accuracy. By standardizing diagnostic ho
functions, the instrument industry will be encouraged
and build better equipment. A good maintenance ap
the owner-maintenance guide and simplified maintena
dures provided by some automakers with their subcom

July 31, 1980 **HS-810 366**

A new car design should minimize the requirement for special tools. Cars should also be designed to minimize damage in crashes, primarily low-speed ones (e.g. improved bumpers). Expensive mechanical components (e.g. drivetrain) should be mounted so as to reduce the likelihood of damage; body panels should be made in parts to reduce post-crash repair work. Cars should be designed so that crash damage is easy and inexpensive to repair (e.g. General Motors X-body car). The servicing of one component should not require the removal of unrelated components, and parts requiring servicing should be protected from corrosion. Service bulletins and "secret" warranty information should be made available to independent garages, as well as to dealers. The consumer should be provided information that will enable him to judge the repairability of cars.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-804 912, "Automobile Inspection, Maintenance and Repair Conference Proceedings," Washington, D.C., 1979 p3-6 1979
Conference held in Washington, D.C., 22-24 May 1979.
Availability: In HS-804 912

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INDEX to ABSTRACTS

blank page

KWOC Title Index

ABBREVIATED
THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

ACCURACY
ADULT AGE AND THE SPEED-ACCURACY TRADE-OFF
HS-027 186

ACTIVATION
A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

ACTIVITY
ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS
HS-027 329

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

ADDITIVES
THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

ADHESIVES
STRUCTURAL ADHESIVES BID FOR BIG PLASTICS-TO-PLASTICS BONDING JOBS
HS-027 221

ADULT
ADULT AGE AND THE SPEED-ACCURACY TRADE-OFF
HS-027 186

ADVANCES
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

ADVISORIES
CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX
HS-805 234

AERODYNAMICS
SLIP THROUGH THE WIND. (AUTOMOBILE AERODYNAMICS)
HS-027 201

AFFECT
HOW WILL DOWNSIZING AFFECT FATALITIES?
HS-027 213

AGE
ADULT AGE AND THE SPEED-ACCURACY TRADE-OFF
HS-027 186

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

AGENCY
EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

AIDED
COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

AIR
A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

AL
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

ALCOHOL
ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

ALCOHOL AND TRAFFIC SAFETY: A SELECT ANNOTATED BIBLIOGRAPHY
HS-027 139

NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

ALUMINUM
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

AMERICAN
AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

APPLICABILITY
APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

APPLIED
WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

APPORTIONING
BRAKE APPORTIONING VALVE SENSES DECELERATION
HS-027 170

ARGUMENT
ARGUMENT CLOUDS GASOHOL ISSUE
HS-027 172

ARROW
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

ART
ELASTOMERS IN DETROIT: STATE OF THE ART, 1980. SPECIAL REPORT
HS-027 327

THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

ASSESS
USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

ASSESSMENT
ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

ASSESSMET
ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

ASSOCIATED
A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

ASSOCIATES
AN ANALYSIS OF THE AUTOMOBILE MARK
MODELING OF THE LONG-RUN DETERMINAN
OF THE DEMAND FOR AUTOMOBILES. VOL. 1--T
WHARTON E.F.A. (ECONOMETRIC FORECASTI
ASSOCIATES) AUTOMOBILE DEMAND MOD
FINAL REPORT
HS-804

AN ANALYSIS OF THE AUTOMOBILE MARK
MODELING OF THE LONG-RUN DETERMINA
OF THE DEMAND FOR AUTOMOBILES. VOL. 2--S
ULATION ANALYSIS USING THE WHARTON E.
(ECONOMETRIC FORECASTING ASSOCIAT
AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804

AN ANALYSIS OF THE AUTOMOBILE MARK
MODELING OF THE LONG-RUN DETERMINA
OF THE DEMAND FOR AUTOMOBILES. VOL. 3-
PENDICES TO THE WHARTON E.F.A. (ECONO
TRIC FORECASTING ASSOCIATES) AUTOMOB
DEMAND MODEL. FINAL REPORT
HS-80

ATTITUDE
CYCLE ROUTES IN PORTSMOUTH. 3--ATTITU
SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, E
LAND)
HS-02

ATTRIBUTES
IMPACT OF EMISSION STANDARDS ON F
ECONOMY AND CONSUMER ATTRIBUTES
HS-02

AUSTRALIAN
THE EFFECTIVENESS OF AUSTRALIAN DES
RULE 22 FOR HEAD RESTRAINTS
HS-02

AUTO
GOVERNMENT ROADMAPS BASIC AUTO
SEARCH
HS-02

THE BIG SHORTFALL IN AUTO FUEL ECON
HS-02

THE TROUBLE WITH AUTO WARRANTIES
HS-02

WILL DOWNSIZING DOWNSIZE YOUR PRO
(AUTO REPAIR INDUSTRY)
HS-02

AUTOMATED
AUTOMATED COLLISION DIAGRAMS
HS-02

DEVELOPMENT AND VALIDATION OF EN
MODELS VIA AUTOMATED DYNAMOMETER T
HS-02

AUTOMATIC
CONCURRENT PHYSIOLOGICAL ACTIVITY
DRIVER AND PASSENGER WHEN DRIVING
AND WITHOUT AUTOMATIC TRANSMISSIO
HEAVY CITY TRAFFIC
HS-0

AUTOMOBILE
ADVANCES IN THE DEVELOPMENT OF LI-AL
(LITHIUM-ALUMINUM/IRON SULFIDE) CELLS
ELECTRIC-AUTOMOBILE BATTERIES
HS-0

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1
HS-027 208

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2
HS-027 209

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY
HS-027 222

SLIP THROUGH THE WIND. (AUTOMOBILE AERODYNAMICS)
HS-027 201

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

AUTOMOBILES

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

NITROSAMINES IN NEW AUTOMOBILES
HS-027 252

AUTOMOTIVE

'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

AUTOMOTIVE GAS TURBINES: WHERE DO THEY STAND?
HS-027 168

BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

DEVELOPMENTS IN AUTOMOTIVE ELECTRONICS
HS-027 279

DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)
HS-027 142

HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

LIGHTER AND LIGHTER. 2ND ANNUAL PLASTICS REFERENCE (AUTOMOTIVE APPLICATIONS)
HS-027 176

NEW AND IMPROVED ELASTOMERS FOR AUTOMOTIVE USES
HS-027 326

ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

AVALANCHE

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

BACK

BACK TO BASICS: TOOLS
HS-027 207

BACKGROUND

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

BASE
A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

BASELINE
CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

BASICS
BACK TO BASICS: TOOLS
HS-027 207

BATTERIES
A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

BATTERY
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

BEHAVIOR
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS
HS-027 329

APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

BEHAVIORAL
EXPLAINING SAFETY HELMET USE BY MOTORC
CLE OPERATORS USING A BEHAVIORAL INTE
TION MODEL
HS-027

BELT
THE EDGE-LOCKING PERFORMANCE OF SO
SEAT BELT INERTIA REELS
HS-027

BELTS
THE EFFECT OF SEAT BELTS ON MINOR A
SEVERE INJURIES MEASURED ON THE ABBRE
ATED INJURY SCALE
HS-027

BIBLIOGRAPHY
ALCOHOL AND TRAFFIC SAFETY: A SELECT
NOTATED BIBLIOGRAPHY
HS-027

SCHOOL BUSES. A BIBLIOGRAPHY
HS-805

BICYCLE
ANALYSIS OF BICYCLE DELAYS AT INTERS
TIONS AND CROSSINGS BY COMPUTER SIMU
TION
HS-027

CHARACTERISTICS OF BICYCLE-RELAT
MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027

CYCLE ROUTES IN PORTSMOUTH. 2–TRAF
STUDIES (SPECIAL BICYCLE ROAD SYSTEM, E
LAND)
HS-027

CYCLE ROUTES IN PORTSMOUTH. 3–ATTITU
SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, E
LAND)
HS-027

BID
STRUCTURAL ADHESIVES BID FOR BIG PLAST
TO-PLASTICS BONDING JOBS
HS-027

BIOMASS
HIGH-GRADE FUELS FROM BIOMASS FARMI
POTENTIALS AND CONSTRAINTS
HS-02

BLADE
BLADE TYPE FUSES FOR ELECTRICAL CIRC
PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-02

BLADON
DRIVING FOR ECONOMY. STUART BLADO
GUIDE TO MONEY-SAVING MOTORING
HS-02

BOARDS
GUIDELINES FOR THE APPLICATION OF AR
BOARDS IN WORK ZONES. FINAL REPORT
HS-02

BODY
OLDSMOBILE OMEGA X-BODY BASELINE WEI
DATA. FINAL REPORT
HS-80

BONDING
STRUCTURAL ADHESIVES BID FOR BIG PLASTICS-TO-PLASTICS BONDING JOBS
HS-027 221

BORE
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

BOSTON
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

BRAKE
BRAKE APPORTIONING VALVE SENSES DECELERATION
HS-027 170

BRASIL
WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

BRAZIL
RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196
THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

BREAKTHROUGHS
MAJOR BREAKTHROUGHS IN DETROIT
HS-027 220

BURN
FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

BUSES
SCHOOL BUSES. A BIBLIOGRAPHY
HS-805 207

BUYING
CAR BUYING FOR THE '80S
HS-027 288

CALIFORNIA
UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

CAMPUS
ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS
HS-027 329

CAR
CAR BUYING FOR THE '80S
HS-027 288
DEPARTMENT OF ENERGY UNVEILS ADVANCED ELECTRIC CAR
HS-027 212
FALL CAR CARE GUIDE, SERVICE TIPS
HS-027 171
HOW TO SURVIVE...WHEN YOUR CAR TURNS INTO A TRAP
HS-027 167
SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

CARBURETOR
CARBURETOR DEPOSITS AND THEIR CONTROL
HS-027 180

CARE
FALL CAR CARE GUIDE, SERVICE TIPS
HS-027 171

CARIBBEAN
EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

CARS
ELECTRIC CARS FOR URBAN TRANSPORTATION
HS-027 277
EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325
NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

CELLS
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

CENTRIFUGAL
AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

CHAMBER
FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

CHANGEABLE
CHANGEABLE MESSAGE SIGNS
HS-027 200

CHARACTERISTICS
CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

CHARGE

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

CHARGING

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

CHECK

HOW TO CHECK AND REPLACE GASKETS AND SEALS
HS-027 217

CHILDSAFE

CHILDSAFE GOES NATIONAL
HS-027 214

CHLORIDE

MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

CHRYSLER

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

CID

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

CIRCUIT

BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

CITY

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION I
HEAVY CITY TRAFFIC
HS-027 1

TRANSPORTATION AND THE CITY, GRADES 8,
INTERDISCIPLINARY STUDENT/TEACHER MAT
RIALS IN ENERGY AND THE ECONOMY
HS-027 1

CLAIM

AUTOMOBILE INSURANCE LOSSES, PERSONA
INJURY PROTECTION COVERAGES; CLAIM FR
QUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 1

CLEAR

STEERING CLEAR
HS-027 2

CLEVELAND

HIGHWAY ACCIDENT REPORT. CROSS-MEDIA
MULTIPLE VEHICLE COLLISION AND FIRE, STAT
ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 19
HS-027 2

CLOUDS

ARGUMENT CLOUDS GASOHOL ISSUE
HS-027 1

CLUES

WARNING: SOMETHING ISN'T QUITE RIGHT HE
(CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 2

CLUTCH

AN ELECTRIC VEHICLE DRIVE CONCEPT USING
CENTRIFUGAL CLUTCH
HS-027 2

COATINGS

ORGANIC COATINGS FOR AUTOMOTIVE PLASTI
HS-027 3

COLLEGE

ACTIVITY SPACES AND TRAVEL BEHAVIOR ON
COLLEGE CAMPUS
HS-027 3

COLLISION

AUTOMATED COLLISION DIAGRAMS
HS-027 2

HIGHWAY ACCIDENT REPORT. CROSS-MEDIA
MULTIPLE VEHICLE COLLISION AND FIRE, STAT
ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 19
HS-027 2

HIGHWAY ACCIDENT REPORT. FORD COURI
PICKUP TRUCK, FIXED-OBJECT COLLISION, P
TUXENT ROAD NEAR CROFTON, MARYLAN
APRIL 23, 1979
HS-027 2

COLLISIONS

ALCOHOL AND OTHER FACTORS IN FATAL M
TORCYCLE COLLISIONS: A PRELIMINARY ANAL
SIS
HS-027 1

COMBAT

THE CRIMINAL USE OF FALSE IDENTIFICATION.
SUMMARY REPORT ON THE NATURE, SCOPE, AN
IMPACT OF FALSE ID USE IN THE UNITED STAT

WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

COMBUSTION

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

ROTARY ENGINE'S LIGHT-LOAD COMBUSTION IMPROVED
HS-027 169

COMFORT

PASSENGER COMFORT--AN OVERVIEW
HS-027 269

VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?
HS-027 270

COMMERCIAL

COMMERCIAL VEHICLE ACCIDENT FACTORS
HS-027 297

COMPARISON

A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

COMPARISONS

FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

COMPATIBILITY

ROADWAY-DRIVER COMPATIBILITY
HS-027 302

COMPENDIUM

A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS
HS-027 254

COMPENSATION

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1
HS-027 208

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2
HS-027 209

COMPETITION

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

COMPLETED

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

COMPLIANCE

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

COMPONENT

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

COMPONENTS

PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS
HS-027 179

COMPOSITION

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

COMPUTED

FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

COMPUTER

ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

COMPUTERIZED

COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

CONCEPT

AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

CONCURRENT

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

CONFERENCE

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE
HS-027 191

CONFLICTS
USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

CONJUNCTION
ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

CONSTRAINTS
HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

CONTAINER
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

CONTINUOUS
MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

CONTROL
CARBURETOR DEPOSITS AND THEIR CONTROL
HS-027 180

DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

CONTROLLER
THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

CONTROLS
A FUEL ECONOMY DEVELOPMENT VEHICLE WI
ELECTRONIC PROGRAMMED ENGINE CONTRO
(EPEC)
HS-027

AN EVALUATION OF PICTOGRAPHIC SYMBO
FOR CONTROLS AND DISPLAYS IN ROAD VE
CLES. FINAL REPORT
HS-027

COPING
COPING WITH INEXPERIENCE
HS-027

COST
ASSESSMENT OF TECHNIQUES FOR COST-EFFI
TIVENESS OF HIGHWAY ACCIDENT COUNTI
MEASURES. EXECUTIVE SUMMARY. FIN
REPORT
HS-027

ASSESSMENT OF TECHNIQUES FOR COST-EFFI
TIVENESS OF HIGHWAY ACCIDENT COUNTI
MEASURES. FINAL REPORT
HS-027

VEHICLE DESIGN IS THE KEY TO LOW CO
MAINTENANCE AND REPAIR
HS-810

COSTS
EFFECT OF SIMPLE ROAD IMPROVEMENT ME
URES ON VEHICLE OPERATING COSTS IN T
EASTERN CARIBBEAN
HS-027

RELATING VEHICLE OPERATING COSTS TO L
VOLUME ROAD PARAMETERS IN BRAZIL
HS-027

THE EFFECT OF ROAD DESIGN AND MAIN
NANCE ON VEHICLE OPERATING COSTS. FIE
RESEARCH IN BRAZIL
HS-027

COUETTE
USE OF A COUETTE HIGH-SHEAR-RATE VISC
METER FOR MEASURING THE VISCOSITY
ENGINE LUBRICANTS
HS-027

COUNTERMEASURES
ASSESSMENT OF TECHNIQUES FOR COST-EFFI
TIVENESS OF HIGHWAY ACCIDENT COUNTE
MEASURES. EXECUTIVE SUMMARY. FIN
REPORT
HS-027

ASSESSMENT OF TECHNIQUES FOR COST-EFFI
TIVENESS OF HIGHWAY ACCIDENT COUNTE
MEASURES. FINAL REPORT
HS-027

COUNTRY
A FIFTEEN-COUNTRY STUDY OF SOME FACTO
INFLUENCING THE NUMBER AND THE SEVERI
OF ROAD ACCIDENTS. PT. 1. BACKGROUND FAC
AND STATISTICS (UNE ETUDE DANS QUINZE PA
DE QUELQUES FACTEURS DETERMINANT
NOMBRE ET LA GRAVITE DES ACCIDENTS DE
ROUTE. PARTIE 1. DONNEES ET STATISTIQUES
BASE
HS-027

COURIER

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979

HS-027 266

COVERAGES

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS

HS-027 163

CRANKING

THE DELCO REMY 5MT CRANKING MOTOR

HS-027 156

CRIMINAL

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM

HS-027 184

CRITIQUE

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE

HS-027 210

CROFTON

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979

HS-027 266

CROSS

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979

HS-027 223

CROSSINGS

ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION

HS-027 298

CRYOGENIC

CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES

HS-027 247

CUBIC

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT

HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT

HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT

HS-805 222

CURB

SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT

HS-027 158

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT

HS-027 159

CYCLE

CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)

HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)

HS-027 286

CYCLISTS

WHY CYCLISTS SHOULD RIDE WITH TRAFFIC

HS-027 205

CYLINDER

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS

HS-027 183

DANGERS

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)

HS-027 282

DANS

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE

HS-027 290

DECELERATION

BRAKE APPORTIONING VALVE SENSES DECELERATION

HS-027 170

DECORATIVE

DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW

HS-027 304

DELAYS

ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION

HS-027 298

DELCO

THE DELCO REMY 5MT CRANKING MOTOR

HS-027 156

DEMAND

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT

HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

DEMONSTRATION

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

DEPARTMENT

A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY
HS-027 216

DEPARTMENT OF ENERGY UNVEILS ADVANCED ELECTRIC CAR
HS-027 212

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

DEPOSITS

A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

CARBURETOR DEPOSITS AND THEIR CONTROL
HS-027 180

DESIGN

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

DESIGNS

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)
HS-027 142

DETECTING

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

DETECTOR

DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

DETERGENCY

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

DETERMINANT

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

DETERMINANTS

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

DETROIT

ELASTOMERS IN DETROIT: STATE OF THE ART, 1980. SPECIAL REPORT
HS-027 327

MAJOR BREAKTHROUGHS IN DETROIT
HS-027 220

DEVELOPMENTS
DEVELOPMENTS IN AUTOMOTIVE ELECTRONICS
HS-027 279

DEVELOPS
COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

DIAGRAMS
AUTOMATED COLLISION DIAGRAMS
HS-027 296

DIESEL
COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

DISPLACEMENT
PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

DISPLAYS
AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

DIVIDED
FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

DOE
ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

DOMINATE
SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

DONNEES
A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

DOT
A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY
HS-027 216

DOWNSIZE
WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)
HS-027 143

DOWNSIZING
HOW WILL DOWNSIZING AFFECT FATALITIES?
HS-027 213

WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)
HS-027 143

DRINK
RED LIGHT FOR DRINK (SIC) DRIVERS
HS-027 202

DRINKING
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

DRIVE
A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

DRIVER
CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

ROADWAY-DRIVER COMPATIBILITY
HS-027 302

THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

DRIVERS
RED LIGHT FOR DRINK (SIC) DRIVERS
HS-027 202

DRIVING
CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH

pages tightly bound

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AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE
HS-027 256

DRUG

NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

DUNLOP

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

DURABILITY

DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

DURABLE

A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

DURATION

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

DUTY

LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

DYNAMOMETER

DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

EASTERN

EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

ECONOMETRIC

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

ECONOMY

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

IN-SERVICE FUEL ECONOMY
HS-027 309

LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

THE BIG SHORTFALL IN AUTO FUEL ECONOMY
HS-027 147

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

EDGE

THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

EFFECTIVENESS

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 [illegible]

THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

EFFICIENCY

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

EFFICIENT

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

EFFORT

OPERATION C.A.R.E. (COMBINED ACCIDENT REDUCTION EFFORT)
HS-027 253

EGR

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

ELASTOMERS

ELASTOMERS IN DETROIT: STATE OF THE ART, 1980. SPECIAL REPORT
HS-027 327

NEW AND IMPROVED ELASTOMERS FOR AUTOMOTIVE USES
HS-027 326

ELECTRIC

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

CURRENT DEVELOPMENT ACTIVITIES ON ELECTRIC VEHICLES IN EUROPE
HS-027 232

DEPARTMENT OF ENERGY UNVEILS ADVANCED ELECTRIC CAR
HS-027 282

ELECTRIC CARS FOR URBAN TRANSPORTATION
HS-027 277

MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

ELECTRICAL

BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

ELECTRONIC

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

ELECTRONICS

DEVELOPMENTS IN AUTOMOTIVE ELECTRONICS
HS-027 279

ELECTROPLATED

DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

EMISSION

IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

EMISSIONS

EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

ENERGY

A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

DEPARTMENT OF ENERGY UNVEILS ADVANCED ELECTRIC CAR
HS-027 212

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

ENFORCEMENT

AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

ENGINE

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

ROTARY ENGINE'S LIGHT-LOAD COMBUSTION IMPROVED
HS-027 169

SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE
HS-027 178

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

ENGINEERING

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)
HS-027 142

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

ENGINES

A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

ENGLAND

CYCLE ROUTES IN PORTSMOUTH. 2–TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 3–ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

ENVIRONMENTAL

EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

ENVIRONMENTS

MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

EPA

EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

EPEC

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

EQUIPMENT

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

ESTIMATION

PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

ETHANOL

WHICH ALCOHOL FUEL FOR BRASIL–METHANOL OR ETHANOL?
HS-027 226

ETUDE

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

EUROPE

CURRENT DEVELOPMENT ACTIVITIES ON ELECTRIC VEHICLES IN EUROPE
HS-027 232

EUROPEAN

ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

EVALUATION

AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

EXCHANGER

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

EXECUTIVE

A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

EXHAUST
EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

EXPERIMENTAL
THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

EXPLAINING
EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

EXTERIOR
DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

FACTEURS
A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

FALL
FALL CAR CARE GUIDE, SERVICE TIPS
HS-027 171

FALSE
THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

FARMING
HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

FAST
DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

FATAL
ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

FATALITIES
HOW WILL DOWNSIZING AFFECT FATALITIES?
HS-027 213

FEDERAL
A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS
HS-027 254

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)
HS-027 142

FES
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

FIELD
THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

FINANCING
STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS
HS-027 299

FIRE
HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

FIXED
HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

FLEET
FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

FLYWHEEL
ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

FMVSS
ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

FOIL

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

FOOD

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

FORD

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

FORECASTING

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

FORGED

MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

FORMATION

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

FREE

CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

FREQUENCIES

ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

FREQUENCY

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

FUEL

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

FUEL FOR THE FUHRER
HS-027 218

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

IN-SERVICE FUEL ECONOMY
HS-027 309

LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

THE BIG SHORTFALL IN AUTO FUEL ECONOMY
HS-027 147

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

FUELED
PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

FUELS
HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

FUHRER
FUEL FOR THE FUHRER
HS-027 218

FUSES
BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

GADGET
GAS-SAVING GADGET...THAT WORKS
HS-027 219

GAS
AUTOMOTIVE GAS TURBINES: WHERE DO THEY STAND?
HS-027 168

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

GAS-SAVING GADGET...THAT WORKS
HS-027 219

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

GASKETS
HOW TO CHECK AND REPLACE GASKETS AND SEALS
HS-027 217

GASOHOL
ARGUMENT CLOUDS GASOHOL ISSUE
HS-027 172

IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

GASOLINE
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE
HS-027 178

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

GLOW
DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

GOVERNMENT
GOVERNMENT ROADMAPS BASIC AUTO RESEARCH
HS-027 173

GRADE
HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

GRADES
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

GRAVITE
A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

GROUPS
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

GUIDANCE
THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

GUIDE

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

FALL CAR CARE GUIDE, SERVICE TIPS
HS-027 171

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE
HS-027 256

GUIDELINES

GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

GUSSAC

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

HANDBOOK

CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

HANDICAPPED

TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

HAZARDS

USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

HEAD

HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY
HS-027 222

THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

HEADED

EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

HEADLINES

A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY
HS-027 216

HEAT

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

HEAVY

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

HELMET

EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

HIGHWAY

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX
HS-805 234

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

EFFECT OF RECREATIONAL VEHICLES ON HIGHWAY SPEED
HS-027 330

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

HOLIDAY

ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

HOSE

HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

HUB

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

HUMAN

MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

HYBRID

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

HYDROGEN

CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

ID

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

IDENTIFICATION

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

IGNITION

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

IMPACT

IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

IMPENDING

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

IMPORTANCE

THE IMPORTANCE OF LANE-CHANGING ON MOTORWAYS
HS-027 140

IMPORTS

SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

IMPROVE

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

IMPROVEMENT

EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

IMPROVEMENTS

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

IMPROVERS

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

IMPROVING

IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

IMPROVING TRAFFIC SAFETY IN RURAL KANSAS
HS-027 262

METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY
HS-027 263

MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE
HS-027 256

INCH

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

INDEX

COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX
HS-805 234

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

INDUCTION

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

INDUSTRY

'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)
HS-027 143

INERTIA

THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

INEXPERIENCE

COPING WITH INEXPERIENCE
HS-027 206

INJURIES

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1
HS-027 208

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2
HS-027 209

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

INJURY

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY
HS-027 222

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

INSPECTION

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

INSULATION

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

INSURANCE

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

INTAKE

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

INTENTION

EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

INTERDISCIPLINARY

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

INTERIM

ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

INTERNATIONAL

LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE
HS-027 191

INTERSECTIONS

ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

INTERSOCIETY

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

INVESTIGATION

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE

SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

IRON

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

ISN

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

ISSUE

ARGUMENT CLOUDS GASOHOL ISSUE
HS-027 172

JAPANESE

THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

JOBS

STRUCTURAL ADHESIVES BID FOR BIG PLASTICS-TO-PLASTICS BONDING JOBS
HS-027 221

JOHN

MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE
HS-027 256

JURISDICTIONS

DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS
HS-027 294

KANSAS

IMPROVING TRAFFIC SAFETY IN RURAL KANSAS
HS-027 262

KENTUCKY

CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148

KEY

CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

KNOWLEDGE

THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

LABORATORY

A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

LAG

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

LANE

THE IMPORTANCE OF LANE-CHANGING ON MOTORWAYS
HS-027 140

LARGE

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

LAWS

LAWS, LAWS AND MORE LAWS. STATE-BY-STATE SUMMARY OF MOPED LAWS AS OF AUGUST, 1979
HS-027 204

LEAN

FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

LEGIBILITY

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

LEVEL

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

LI

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

LIGHT

LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

RED LIGHT FOR DRINK (SIC) DRIVERS
HS-027 202

ROTARY ENGINE'S LIGHT-LOAD COMBUSTION IMPROVED
HS-027 169

LIGHTER

LIGHTER AND LIGHTER. 2ND ANNUAL PLASTICS REFERENCE (AUTOMOTIVE APPLICATIONS)
HS-027 176

LIMITS

SPEED LIMITS. SAFETY SUCCESS OR MUDDLED MEDDLING?
HS-027 189

LINES
THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

LIQUID
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

LIST
SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

LITERATURE
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

LITHIUM
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

LOAD
ROTARY ENGINE'S LIGHT-LOAD COMBUSTION IMPROVED
HS-027 169

LOADS
USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

LOCAL
DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS
HS-027 294

LOCATION
COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

LOCKING
THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

LONG
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

LOOK
A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY
HS-027 216

LORAN
THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

LOSSES
AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

LOW
A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE
HS-027 191

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

LUBRICANTS
USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

MACHINING
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

MAINTENANCE

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

MAJOR

MAJOR BREAKTHROUGHS IN DETROIT
HS-027 220

MANIFOLD

COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

MANUAL

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

MARKET

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

MARYLAND

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

MASS

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

MASSACHUSETTS

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

MATERIALS

MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

MEASURED

FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

MEASUREMENTS

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

MEASURES

EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

MEASURING

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

MECHANICAL

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

MECHANISMS

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

MEDDLING

SPEED LIMITS. SAFETY SUCCESS OR MUDDLED MEDDLING?
HS-027 189

MEDIAN

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

MESSAGE
CHANGEABLE MESSAGE SIGNS HS-027 200

METAL
A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION HS-027 241
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS HS-027 155
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY HS-027 245

METHANOL
WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL? HS-027 226

METHOD
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES HS-027 182

METHODS
ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS HS-027 303
METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY HS-027 263
SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION) HS-027 138

MICHIGAN
COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM HS-027 295
MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT HS-027 199

MILES
MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE HS-027 256

MINOR
THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE HS-027 274

MIXTURES
TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES HS-027 280

MODAL
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS HS-027 307

MODEL
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT HS-804 847
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT HS-804 848
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT HS-804 855
EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL HS-027 267
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE HS-027 190

MODELING
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT HS-804 847
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT HS-804 848
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT HS-804 855
MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES HS-027 246

MODELS
AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS HS-027 163
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS HS-027 153
MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS HS-027 271

MODES

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

MONEY

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

MOPED

IT'S MOPED TIME!
HS-027 203

LAWS, LAWS AND MORE LAWS. STATE-BY-STATE SUMMARY OF MOPED LAWS AS OF AUGUST, 1979
HS-027 204

MOTION

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

MOTOR

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148

MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

THE DELCO REMY 5MT CRANKING MOTOR
HS-027 156

MOTORCYCLE

ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

MOTORING

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

MOTORS

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

MOTORWAYS

THE IMPORTANCE OF LANE-CHANGING ON MOTORWAYS
HS-027 140

MOVING

EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

MT

THE DELCO REMY 5MT CRANKING MOTOR
HS-027 156

MUDDLED

SPEED LIMITS. SAFETY SUCCESS OR MUDDLED MEDDLING?
HS-027 189

MULTI

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

MULTIPLE

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

NATIONAL

CHILDSAFE GOES NATIONAL
HS-027 214

CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX
HS-805 234

NATIONAL TRANSPORTATION STATISTICS. ANNUAL REPORT
HS-027 160

NATURE

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

NIGHTTIME

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

NITRIC

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

NITRILE

HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

NITROSAMINES

NITROSAMINES IN NEW AUTOMOBILES
HS-027 252

NOMBRE

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

NOVEL

A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

NUMBER

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

OBJECT

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

OCTANE

FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

OHIO

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

OILS

ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

OLDSMOBILE

OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

OMEGA

OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

OPERATION

OPERATION C.A.R.E. (COMBINED ACCIDENT REDUCTION EFFORT)
HS-027 253

OPERATORS

EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

OPINION

MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

OPTIMIZATION

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

ORGANIC

ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

ORIGIN

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

OVERSIZE

USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

OVERVIEW

PASSENGER COMFORT--AN OVERVIEW
HS-027 269

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

OXIDE

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

PACKAGE

COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

PARAMETER

PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

PARKING

SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT
HS-027 159

PARTIE

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA

ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

PASSENGER

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

PASSENGER COMFORT--AN OVERVIEW
HS-027 269

VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?
HS-027 270

PATUXENT

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

PAYS

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

PERFORMANCE

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

PERSONAL

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

PHYSIOLOGICAL

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

PICKUP

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

PICTOGRAPHIC

AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

PISTON

CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

PLANNERS

CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

PLASTIC

PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS
HS-027 179

PLASTICS

DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

LIGHTER AND LIGHTER. 2ND ANNUAL PLASTICS REFERENCE (AUTOMOTIVE APPLICATIONS)
HS-027 176

ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

STRUCTURAL ADHESIVES BID FOR BIG PLASTICS-TO-PLASTICS BONDING JOBS
HS-027 221

PLUG
DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

PM
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

POLICIES
A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS
HS-027 254

POLLUTANT
FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

POPULATION
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

PORTSMOUTH
CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

POTENTIALS
ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

POWDER
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

POWER
ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

POWERED
A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

PREDICT
VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?
HS-027 270

PREDICTING
PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

PREDICTION
PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

PRELIMINARY
ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

PRESENCE
THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

PRIMARY
THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

PROBLEM
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

PROCEDURE
PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

PROCEDURES
SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

PROCEEDINGS

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

PROCESS

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

PRODUCT

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

PROFITS

WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)
HS-027 143

PROGRAMMED

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

PROJECT

TRANSPORTATION SYSTEM SAFETY AND PROJECT ANALYSIS
HS-027 258

TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

PROJECTS

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

PROPULSION

A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

PROTECTION

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

PUBLIC

MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

PUBLIC TRANSPORTATION AND THE TRAVEL NEEDS OF WOMEN
HS-027 331

QUANTIFICATION

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

QUIET

'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

QUINZE

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

QUITE

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

RATE

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

REACTION

MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

REACTOR

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

RECEIVERS

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

RECIRCULATION

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

RECOMMENDATIONS

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

RECORDS

DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS
HS-027 294

SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS
HS-027 292

RECREATIONAL

A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

EFFECT OF RECREATIONAL VEHICLES ON HIGHWAY SPEED
HS-027 330

RED

RED LIGHT FOR DRINK (SIC) DRIVERS
HS-027 202

REDUCED

THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

REDUCTION

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

OPERATION C.A.R.E. (COMBINED ACCIDENT REDUCTION EFFORT)
HS-027 253

REELS

THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

REFERENCE

LIGHTER AND LIGHTER. 2ND ANNUAL PLASTICS REFERENCE (AUTOMOTIVE APPLICATIONS)
HS-027 176

REFLECTIVE

A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

REFUELING

CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

REGENERATIVE

REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

REGULATORY

'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

REHABILITATION

NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

RELATING

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

RELATIVELY

'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

REMY

THE DELCO REMY 5MT CRANKING MOTOR
HS-027 156

REPAIR

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)
HS-027 143

REPLACE

HOW TO CHECK AND REPLACE GASKETS AND SEALS
HS-027 217

REQUIREMENTS

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

RESEARCH

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

GOVERNMENT ROADMAPS BASIC AUTO RESEARCH
HS-027 173

HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY
HS-027 222

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

RESOURCES

STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS
HS-027 299

RESPONSIVE

EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

RESTRAINTS

THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

RESULTS

AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

REVIEW

A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

REVIEWING

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

RIDE

FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

WHY CYCLISTS SHOULD RIDE WITH TRAFFIC
HS-027 205

RIGHT

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

ROAD

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

ROADMAPS

GOVERNMENT ROADMAPS BASIC AUTO RESEARCH
HS-027 173

ROADS

A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE
HS-027 191

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

ROADSIDE

METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY
HS-027 263

ROADWAY

ROADWAY-DRIVER COMPATIBILITY
HS-027 302

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

ROTARY

ROTARY ENGINE'S LIGHT-LOAD COMBUSTION IMPROVED
HS-027 169

ROUTE

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

ROUTES

CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

RUBBER
HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

RULE
THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

RUN
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

RURAL
HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

IMPROVING TRAFFIC SAFETY IN RURAL KANSAS
HS-027 262

SAMOA
AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

SAVING
DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

GAS-SAVING GADGET...THAT WORKS
HS-027 219

SCALE
THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

SCENE
'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

SCHOOL
SCHOOL BUSES. A BIBLIOGRAPHY
HS-805 207

SCOPE
THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

SEALS
HOW TO CHECK AND REPLACE GASKETS AND SEALS
HS-027 217

SEAT
THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

SELECT
ALCOHOL AND TRAFFIC SAFETY: A SELECT ANNOTATED BIBLIOGRAPHY
HS-027 139

SELECTIVE
AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

SELF
DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

SENSES
BRAKE APPORTIONING VALVE SENSES DECELERATION
HS-027 170

SENSITIVITY
PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

SERVICE
EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

FALL CAR CARE GUIDE, SERVICE TIPS
HS-027 171

IN-SERVICE FUEL ECONOMY
HS-027 309

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

SEVERE

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

SEVERITY

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

SHEAR

ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

SHORTAGES

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

SHORTFALL

THE BIG SHORTFALL IN AUTO FUEL ECONOMY
HS-027 147

SIGN

A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

SIGNAL

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

SIGNS

CHANGEABLE MESSAGE SIGNS
HS-027 200

EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

SIMULATION

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS
HS-027 292

SIMULATORS

AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

SLIP

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

SLIP THROUGH THE WIND. (AUTOMOBILE AERODYNAMICS)
HS-027 201

SLOW

EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

SMALL

SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

SOURCE

ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

SOURCES

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

SOUTHERN

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

SPACES

ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS
HS-027 329

SPARK

MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

SPEED

ADULT AGE AND THE SPEED-ACCURACY TRADE-OFF
HS-027 186

EFFECT OF RECREATIONAL VEHICLES ON HIGHWAY SPEED
HS-027 330

SPEED LIMITS. SAFETY SUCCESS OR MUDDLED MEDDLING?
HS-027 189

STABILITY

ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

STAND

AUTOMOTIVE GAS TURBINES: WHERE DO THEY STAND?
HS-027 168

STANDARD

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

STANDARDS

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)
HS-027 142

HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY
HS-027 222

IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

START

DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

STATES

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1
HS-027 208

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2
HS-027 209

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

STATISTICS

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

NATIONAL TRANSPORTATION STATISTICS. ANNUAL REPORT
HS-027 160

STATISTIQUES

A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

STEERING

STEERING CLEAR
HS-027 215

STEPS

FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

STIRLING

A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

STORAGE

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

STRATEGY

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

STRATIFIED

FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

STREET

COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

STRUCTURAL

STRUCTURAL ADHESIVES BID FOR BIG PLASTICS-TO-PLASTICS BONDING JOBS
HS-027 221

STUART

DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

STUDENT

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

SUBJECTS

VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?
HS-027 270

SUITABLE

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

SULFIDE

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

SURVEY

A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY
HS-027 216

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

SURVEYS

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

SURVIVE

HOW TO SURVIVE...WHEN YOUR CAR TURNS INTO A TRAP
HS-027 167

SWITCHING

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

SYMBOLS

AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

TEACHER

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

TECHNOLOGY

CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

NEW TRANSPORTATION SYSTEMS AND TECHNOLOGY--1979
HS-027 276

ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS
HS-027 292

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

TERRESTRIAL

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

TEST

EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

TESTING

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

TESTS

DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

THEORY

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

THERMAL

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

TIME

IT'S MOPED TIME!
HS-027 203

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

TIPS

FALL CAR CARE GUIDE, SERVICE TIPS HS-027 171

TIRES

COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP) HS-027 161

TOOLS

BACK TO BASICS: TOOLS HS-027 207

TRADE

ADULT AGE AND THE SPEED-ACCURACY TRADE-OFF HS-027 186

TRAFFIC

ALCOHOL AND TRAFFIC SAFETY: A SELECT ANNOTATED BIBLIOGRAPHY HS-027 139

AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA HS-027 324

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC HS-027 185

CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX HS-805 234

CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND) HS-027 285

DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS HS-027 294

IMPROVING TRAFFIC SAFETY IN RURAL KANSAS HS-027 262

SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS HS-027 292

USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS HS-027 265

WHY CYCLISTS SHOULD RIDE WITH TRAFFIC HS-027 205

TRANSMISSION

CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC HS-027 185

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT HS-027 333

TRANSPORTATION

A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS HS-027 254

A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY HS-027 216

APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION HS-027 261

APPLICATIONS OF FUEL CELLS IN TRANSPORTATION HS-027 234

CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS HS-027 260

CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT HS-027 224

ELECTRIC CARS FOR URBAN TRANSPORTATION HS-027 277

NATIONAL TRANSPORTATION STATISTICS. ANNUAL REPORT HS-027 160

NEW TRANSPORTATION SYSTEMS AND TECHNOLOGY--1979 HS-027 276

PUBLIC TRANSPORTATION AND THE TRAVEL NEEDS OF WOMEN HS-027 331

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION) HS-027 138

STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS HS-027 299

TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY HS-027 174

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES HS-027 259

TRANSPORTATION SYSTEM SAFETY AND PROJECT ANALYSIS HS-027 258

TRANSPORTING

USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS HS-027 265

TRAP

HOW TO SURVIVE...WHEN YOUR CAR TURNS INTO A TRAP HS-027 167

TRAVEL

ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS HS-027 329

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

PUBLIC TRANSPORTATION AND THE TRAVEL NEEDS OF WOMEN
HS-027 331

TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

TRENDS
LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

TRONOMIC
FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

TROUBLE
EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

THE TROUBLE WITH AUTO WARRANTIES
HS-027 144

TRUCK
HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

TRUCKS
EPA (ENVIRONMENTAL PROTECTION AGENCY): HEADED FOR TROUBLE ON TRUCKS AND CARS
HS-027 325

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

TURBINES
AUTOMOTIVE GAS TURBINES: WHERE DO THEY STAND?
HS-027 168

TURBOCHARGED
SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE
HS-027 178

TURBOCHARGING
TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

TURNS
HOW TO SURVIVE...WHEN YOUR CAR TURNS INTO A TRAP
HS-027 167

TYPE
BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

UNIT
ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

UNITED
AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1
HS-027 208

AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2
HS-027 209

THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

UNLEADED
IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

UNVEILS
DEPARTMENT OF ENERGY UNVEILS ADVANCED ELECTRIC CAR
HS-027 212

URBAN
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

ELECTRIC CARS FOR URBAN TRANSPORTATION
HS-027 277

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

USER
USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

USES
NEW AND IMPROVED ELASTOMERS FOR AUTOMOTIVE USES
HS-027 326

VALIDATION
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

VALUES
IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

VALVE

BRAKE APPORTIONING VALVE SENSES DECELERATION
HS-027 170

VARIABILITY

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

VEHICLE

A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148

COMMERCIAL VEHICLE ACCIDENT FACTORS
HS-027 297

DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

VEHICLES

A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

CURRENT DEVELOPMENT ACTIVITIES ON ELECTRIC VEHICLES IN EUROPE
HS-027 232

EFFECT OF RECREATIONAL VEHICLES ON HIGHWAY SPEED
HS-027 330

EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

VEHICULAR

ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

VIBRATION

MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?
HS-027 270

VISCOMETER

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

VISCOSITY

USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

VISIBILITY

THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

VOLUME

A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE
HS-027 191

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

VW

NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

WARNING

EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

WARRANTIES

THE TROUBLE WITH AUTO WARRANTIES
HS-027 144

WASHINGTON

AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

WATCHDOG

THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

WEEKDAY

ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

WEEKEND

ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

WEIGHT

OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

WHARTON

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

WHEEL

WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

WIND
SLIP THROUGH THE WIND. (AUTOMOBILE AERODYNAMICS)
HS-027 201

WINDSHIELD
PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS
HS-027 179

WIPER
PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS
HS-027 179

WOMEN
PUBLIC TRANSPORTATION AND THE TRAVEL NEEDS OF WOMEN
HS-027 331

WORK
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

WORKS
GAS-SAVING GADGET...THAT WORKS
HS-027 219

WORST
SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

WRITTEN
THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

YORK
NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

ZINC
MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

ZONES
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

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Author Index

Agent, Kenneth R.
CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148

Alexander, D. L.
ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

Allegrante, John Philip
EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

Allemang, R. J.
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

Allen, R. Wade
AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

Altendorf, J.-P.
AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

Andon, Jerar
OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

Angus, G. D.
FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

Ashford, N. J.
TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

Ashton, Charles R.
THE DELCO REMY 5MT CRANKING MOTOR
HS-027 156

Audino, Kenneth R.
BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

Bair, Brent O.
ROADWAY-DRIVER COMPATIBILITY
HS-027 302

Bartholme, L. G.
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

Batt, Richard A.
PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS
HS-027 179

Beachley, N. H.
THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

Beals, D. L.
EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

Beishline, Allen W.
WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

Benjamin, Timothy
A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACTEURS DETERMINANT LE NOMBRE ET LA GRAVITE DES ACCIDENTS DE LA ROUTE. PARTIE 1. DONNEES ET STATISTIQUES DE BASE
HS-027 290

Benson, R. S.
COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

Bevilacqua, Oreste M.
ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

Bladon, Stuart
DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

Bobbett, Ronald
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Bockstiegel, G.
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

Bowden, J. N.
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

Box, P. C.
SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT
HS-027 159

Boziuk, Joseph
PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

Bracco, F. V.
FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

Brown, D. L.
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

Brown, George W.
ROADWAY-DRIVER COMPATIBILITY
HS-027 302

Brown, Robert E.
DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

Bryant, W. A.
A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

Buhlman, M. A.
ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

Bunch, Howard M.
HOW WILL DOWNSIZING AFFECT FATALITIES?
HS-027 213

Butler, Bertell C.
RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

Buttgereit, Werner
NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

Buzzelli, E. S.
A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

Byun, Joonho
CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

Callahan, Joseph M.
ARGUMENT CLOUDS GASOHOL ISSUE
HS-027 172

Cameron, M. H.
THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

Cantilli, Edmund J.
APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

Carpetis, C.
CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

Carr, P.
MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

Carter, Luther J.
THE BIG SHORTFALL IN AUTO FUEL ECONOMY
HS-027 147

Carvalho, A. V. , Jr.
WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

Casey, Robert
SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

Cerullo, Bob
STEERING CLEAR
HS-027 215

Chaiken, Kathleen
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

Chi, C. H.
MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

Childs, Barbara
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

Chilenskas, A.
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

Claybrook, Joan
VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

Coos, R.
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

Copas, Thomas L.
CHANGEABLE MESSAGE SIGNS
HS-027 200

STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS
HS-027 299

Creighton, John R.
A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

Daniels, Jeffrey
DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

Date, K.
THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

Datta, Tapan K.
AUTOMATED COLLISION DIAGRAMS
HS-027 296

COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

De Morais, Pedro Jose
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

De Quadros, Luiz A. P.
THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

Desmond, Winifred F. , comp.
CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX
HS-805 234

DeLuca, W.
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

Drescher, Robert
A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

Dudek, Conrad L.
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

CHANGEABLE MESSAGE SIGNS
HS-027 200

Ecklund, E. Eugene
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

Edelfelt, I. H.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

Eggert, W.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Eisenhaure, David
A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

Enserink, E.
ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

Escher, William J. D.
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

Fales, Ed
HOW TO SURVIVE...WHEN YOUR CAR TURNS INTO A TRAP
HS-027 167

Falk, Ronald
OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

Feeney, R. J.
TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

Ferrara, Thomas C.
ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

Fine, D. H.
NITROSAMINES IN NEW AUTOMOBILES
HS-027 252

Fleischer, G. A.
COMMERCIAL VEHICLE ACCIDENT FACTORS
HS-027 297

Flynn, Lois , comp.
SCHOOL BUSES. A BIBLIOGRAPHY
HS-805 207

Fowle, A. A.
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

Fox, K.
THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

Frank, A. A.
THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

Gakis, John D.
THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

Gay, E. C.
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

Gazely, D.
TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

Gentry, K.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Giacomazzi, R. A.
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

Gibbs, L. M.
CARBURETOR DEPOSITS AND THEIR CONTROL
HS-027 180

Glennon, John C.
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

HIGHWAY SAFETY REQUIREMENTS FOR LOW-VOLUME RURAL ROADS
HS-027 193

METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY
HS-027 263

Glumm, Monica M.
AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

Goddard, S. J.
TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

Goldman, Arthur
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

Goldman, Gary S.
WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

Goldwater, B. S.
CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

Graham, Jerry L.
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

Griffin, Lindsay I.
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

Griffin, Michael J.
MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

Giuliano, Genevieve
PUBLIC TRANSPORTATION AND THE TRAVEL NEEDS OF WOMEN
HS-027 331

Gunderson, John A.
EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

Hall, Douglas C.
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULA-

TION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

Hall, Douglas C.
A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

Haluza, Paul T.
'79 REGULATORY SCENE IS RELATIVELY QUIET (AUTOMOTIVE INDUSTRY)
HS-027 162

Hamilton, William
ELECTRIC CARS FOR URBAN TRANSPORTATION
HS-027 277

Harmatuck, Donald J.
EFFECT OF RECREATIONAL VEHICLES ON HIGHWAY SPEED
HS-027 330

Harrison, Robert
THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

Harrow, Barry R.
THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

Hartley, John
FUEL ECONOMY AND EMISSIONS OF LEAN-BURN ENGINES. CONFERENCE REPORT
HS-027 281

Hartman, G. S.
EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

Harvey, Donald R.
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

Heinsheimer, Thomas F.
UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

Heiss, William
THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

Herd, Donald R.
ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

Hide, H.
EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

Hiereth, Hermann
SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE
HS-027 178

Hodges, Paula D.
GOVERNMENT ROADMAPS BASIC AUTO RESEARCH
HS-027 173

Hornstra, F.
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

Horodniceanu, Michael
APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

Horvath, James W.
HIGH PERFORMANCE NITRILE RUBBER AUTOMOTIVE FUEL HOSE
HS-027 328

Howard, Tony
MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE
HS-027 256

Howe, John W.
THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

Hudson, R.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Hudson, William R.
RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

Huff, Jim
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Huffman, F. N.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Humphreys, David W.
THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

Humphreys, J. B.
SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158
SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT
HS-027 159

Jacobson, I. D.
MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

Jamzadeh, F.
THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

Jawetz, Pincas
IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

Johansson, Lennart
A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

Johnson, Bette
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

Johnston, A. A.
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

Jones, D. W.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

Kaesehagen, Russ L.
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

Katz, Maurice J.
THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

Keith, D.
EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

Kendall, Don
SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

Klein, Richard H.
AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

Klunder, Kurt W.
THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

Knobeloch, Gerald W.
FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

Koch, R. R.
ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

Krall, Albert D.
DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

Kreindler, Michael L.
APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

Kuhlthau, A. R.
MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

Lam, Tenny N.
ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

Lampert, William B.
A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

Lanman, M. H. , 3rd.
EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

Leach, M. A.
AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

Lenko, Daniel S.
DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

Leonard, Jack
COMPETITION DEVELOPS THE PRODUCT (DESIGN OF MOTORCYCLE TIRES, DUNLOP)
HS-027 161

Leslie, Gay I. , ed.
CHANGEABLE MESSAGE SIGNS
HS-027 200
STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS
HS-027 299

Lewis, Christopher H.
MECHANISMS OF THE EFFECTS OF VIBRATION FREQUENCY, LEVEL AND DURATION ON CONTINUOUS MANUAL CONTROL PERFORMANCE
HS-027 187

LePera, M. E.
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

Lipinski, Martin E.
DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS
HS-027 294

Litvin, David M.
AUTOMATED COLLISION DIAGRAMS
HS-027 296

Lockhart, Bruce D.
A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

Loutzenheiser, Roy C.
IMPROVING TRAFFIC SAFETY IN RURAL KANSAS
HS-027 262

Low, S. C.
COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

Lowne, R. W.
THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

Loxley, Colin
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

Loxley, Colin J.
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

Lum, H. S.
EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

Lund, Bob
WILL DOWNSIZING DOWNSIZE YOUR PROFITS? (AUTO REPAIR INDUSTRY)
HS-027 143

Lustenader, E. L.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

Lyles, R. W.
EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

Lynn, David
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Mach, Thomas
WARNING: SOMETHING ISN'T QUITE RIGHT HERE (CLUES TO IMPENDING ROADWAY DANGERS)
HS-027 282

Maeda, T.
THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

Maeda, Y.
THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

Mandel, Leon
CAR BUYING FOR THE '80S
HS-027 288

Mannering, Fred L.
FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

Marbach, H. W. , Jr.
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

Marshall, John F.
HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

Martini, W. R.
A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

Martino, F. J.
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

Martz, Jack W.
FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

Maslanka, Victor
ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

Mather, J.
USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

Matsuda, S.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Mauro, Peter G.
THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

McAlevy, Robert F. , 3rd.
PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

McBreen, J.
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

McCann, Michael K.
LIGHTER AND LIGHTER. 2ND ANNUAL PLASTICS REFERENCE (AUTOMOTIVE APPLICATIONS)
HS-027 176

McCormick, Byron
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

McFarland, William F.
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

McLaughlin, Mary , ed.
SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS
HS-027 292

McLean, W. J.
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

McShane, William R.
CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

McWhannell, D. C.
TURBOCHARGING WITH THERMAL REACTOR, EGR (EXHAUST GAS RECIRCULATION) AND ALCOHOL-GASOLINE MIXTURES
HS-027 280

Mergeay, M.
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

Migletz, Donald J.
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

Miles, John
MILES' BETTER DRIVING. JOHN MILES' GUIDE TO IMPROVING YOUR TECHNIQUE
HS-027 256

Miskolczy, G.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Morris, Anne
TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

Moser, Barry K.
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

Muhren, C.
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

Murrell, J. D.
LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

Murtland, W. O.
ELASTOMERS IN DETROIT: STATE OF THE ART, 1980. SPECIAL REPORT
HS-027 327

Nazemi, Mike A.
UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

Nelson, Sam
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Nettleton, Tom
A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

Nevitt, John S.
UNLEADED GASOLINE SHORTAGES AND FUEL SWITCHING. THE POTENTIAL IMPACT IN SOUTHERN CALIFORNIA
HS-027 337

Nicholson, F. J.
CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 285

Nishizaki, T.
THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

O'Loughlin, John V.
ACTIVITY SPACES AND TRAVEL BEHAVIOR ON A COLLEGE CAMPUS
HS-027 329

Oborne, D. J.
PASSENGER COMFORT--AN OVERVIEW
HS-027 269

VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?
HS-027 270

Oetting, H.
IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

Ojefors, Lars
CURRENT DEVELOPMENT ACTIVITIES ON ELECTRIC VEHICLES IN EUROPE
HS-027 232

Olson, Paul L.
EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

Olszanski, T. W.
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

Ott, Marian
SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

Page, Elizabeth
SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

Paulthorp, J. R.
NEW AND IMPROVED ELASTOMERS FOR AUTOMOTIVE USES
HS-027 326

Parker, Martin R. , Jr.
USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

Pastalan, Leon A.
EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

Pelfrey, Eric
ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

Pennock, Herbert A.
CHANGEABLE MESSAGE SIGNS
HS-027 200

STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS
HS-027 299

Perkins, David D.
PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

Perlsweig, M.
ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

Peschka, W.
CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

Peterson, Edward L.
FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

Petrykanyn, John
THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

Phillips, Don T.
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

Pigman, Jerry G.
ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

Piland, Barrie
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

Plunkett, A. B.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

Powell, J. D.
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

Quenault, S. W.
CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

Raja, R.
IN-SERVICE FUEL ECONOMY
HS-027 309

Rao, H. S.
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

Raymond, W. J.
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

Raynard, Arthur E.
ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

Rein, S. W.
ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

Reisch, J.
NITROSAMINES IN NEW AUTOMOBILES
HS-027 252

Reynen, T. A.
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

Rice, Timothy I.
IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

Richards, L. G.
MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS
HS-027 271

Richardson, C. E.
CARBURETOR DEPOSITS AND THEIR CONTROL
HS-027 180

Richter, E.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

Rizenbergs, Rolands L.
ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

Roberts, A. K.
THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

Rodgers, Richard J.
COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

Rollins, John B.
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

Rounbehler, D. P.
NITROSAMINES IN NEW AUTOMOBILES
HS-027 252

Saaski, E. W.
A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

Salthouse, Timothy A.
ADULT AGE AND THE SPEED-ACCURACY TRADEOFF
HS-027 186

Sanders, D. B.
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

Santos, G.
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Sator, Karlhans
NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

Scarlett, Michael
DRIVING FOR ECONOMY. STUART BLADON'S GUIDE TO MONEY-SAVING MOTORING
HS-027 257

Scarzello, John F.
DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

Schubert, John
WHY CYCLISTS SHOULD RIDE WITH TRAFFIC
HS-027 205

Schultz, Mort
FUEL FOR THE FUHRER
HS-027 218

GAS-SAVING GADGET...THAT WORKS
HS-027 219

HOW TO CHECK AND REPLACE GASKETS AND SEALS
HS-027 217

Schwartz, M W.
THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

Scipio, Leon
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

Setright, L. J. K.
SLIP THROUGH THE WIND. (AUTOMOBILE AERODYNAMICS)
HS-027 201

Sharp, Michael C.
METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY
HS-027 263

Sheth, Narenda J.
IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

Shimotake, H.
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243

Simpson, H. M.
ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

Singer-Bart, Susan , ed.
NEW TRANSPORTATION SYSTEMS AND TECHNOLOGY--1979
HS-027 276

Sinha, Kumares C.
FORECASTING AUTOMOBILE FLEET FUEL EFFICIENCY
HS-027 332

Sivak, Michael
EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

Smalley, Marv
OPERATION C.A.R.E. (COMBINED ACCIDENT REDUCTION EFFORT)
HS-027 253

Soccoli, F.
THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

South, N. E.
IN-SERVICE FUEL ECONOMY
HS-027 309

Sparmann, Udo
THE IMPORTANCE OF LANE-CHANGING ON MOTORWAYS
HS-027 140

Spear, Bruce D.
SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

Spooren, E. W.
ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

Srinivasan, S.
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Stanton, William
A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

Stockton, William R.
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

Stoke, C. B.
THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

Sturzebecher, Ulrich
NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

Sullivan, T. D.
SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT
HS-027 159

Sundeen, Arthur R.
DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

Swait, Joffre D. , Jr.
PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

Syed, S. A.
FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

Symons, P. C.
MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

Teixeira de Carvalho, Jose
RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

Tennant, J. A.
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

Thielbahr, W.
ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

Thompson, Douglas A.
DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

Trella, Thomas
SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

Trindade, S. C.
WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

Turnbull, F. G.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

Umbs, Rudolph M.
PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

Vizard, David
FUEL FOOD. A GAS-TRONOMIC GUIDE TO OCTANE IMPROVERS
HS-027 145

Volz, T.
THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

Waldmann, Madeleine
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

Warren, R. A.
ALCOHOL AND OTHER FACTORS IN FATAL MOTORCYCLE COLLISIONS: A PRELIMINARY ANALYSIS
HS-027 175

Waters, E. D.
A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

Watts, G. R.
THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

Weisz, Paul B.
HIGH-GRADE FUELS FROM BIOMASS FARMING: POTENTIALS AND CONSTRAINTS
HS-027 289

Welsh, P.
THE ELECTRONIC GAS WATCHDOG. A UNIT SUITABLE FOR DETECTING THE PRESENCE OF GAS IN A SIGNAL CONTROLLER
HS-027 141

Wessels, J. P.
THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

Westbrook, Charles K.
FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

Westbrook, M. H.
DEVELOPMENTS IN AUTOMOTIVE ELECTRONICS
HS-027 279

Wheeler, D. J.
SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT
HS-027 159

Wiegand, Dieter
AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

Wilson, R. P.
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

Winokur, Joseph
THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

Winterbone, D. E.
COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

Withalm, Gert
SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE
HS-027 178

Wolfe, Arthur C.
MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

Wood, A. Stuart
MAJOR BREAKTHROUGHS IN DETROIT
HS-027 220

Wright, B.
USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

Wyatt, Richard J.
THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

Yang, V.
WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

Zaniewski, John P.
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

Zegeer, Charles V.
CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148

Zeier, H.
CONCURRENT PHYSIOLOGICAL ACTIVITY OF DRIVER AND PASSENGER WHEN DRIVING WITH AND WITHOUT AUTOMATIC TRANSMISSION IN HEAVY CITY TRAFFIC
HS-027 185

Ziedman, Kenneth
AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

Zimmerman, Ray
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

Zino, Ken
A LOOK BEHIND THE HEADLINES--TO SURVEY THE DOT (DEPARTMENT OF TRANSPORTATION) SURVEY
HS-027 216

ENGINEERING THE '80S (AUTOMOTIVE DESIGNS TO MEET FEDERAL STANDARDS)
HS-027 142

Zwanzig, Frances R. , ed.
TRANSPORTATION SYSTEM SAFETY AND PROJECT ANALYSIS
HS-027 258

Corporate Author Index

AiResearch Mfg. Co. of California, 2525 West 190th St., Torrance, Calif. 90509
ADVANCED FLYWHEEL ENERGY STORAGE UNIT FOR A HIGH POWER ENERGY SOURCE FOR VEHICULAR USE
HS-027 236

Alliance of American Insurers, All-Industry Res. Advisory Com., 20 N. Wacker Dr., Chicago, Ill. 60606
AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 1
HS-027 208
AUTOMOBILE INJURIES AND THEIR COMPENSATION IN THE UNITED STATES. VOL. 2
HS-027 209

American Chemical Society, 1155 16th St., N.W., Washington, D.C. 20036
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 1
HS-027 225
INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (14TH) PROCEEDINGS. BOSTON, MASSACHUSETTS, AUGUST 5-10, 1979. VOL. 2
HS-027 251

Argonne National Lab., Chemical Engineering Div., Argonne, Ill. 60439
ADVANCES IN THE DEVELOPMENT OF LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) CELLS FOR ELECTRIC-AUTOMOBILE BATTERIES
HS-027 243
A CHARGING SYSTEM FOR THE LI-AL/FES (LITHIUM-ALUMINUM/IRON SULFIDE) ELECTRIC VEHICLE BATTERY
HS-027 244

Army Human Engineering Lab., Aberdeen Proving Ground, Md. 21005
AN EVALUATION OF PICTOGRAPHIC SYMBOLS FOR CONTROLS AND DISPLAYS IN ROAD VEHICLES. FINAL REPORT
HS-027 165

Army Mobility Equipment Res. and Devel. Command, Energy and Water Resources Lab., Ft. Belvoir, Va.
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

Army Mobility Res. and Devel. Command, DRDME-EC, Ft. Belvoir, Va. 22060
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Arthur D. Little, Inc.
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

Automotive OEM
ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

Brazilian Road Res. Inst.
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

British Devel. Div. in the Caribbean, Barbados
EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

Brookhaven National Lab., Upton, N.Y. 11973
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Budd Technical Center, Fort Washington, Pa. 19034
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

California Inst. of Tech., Jet Propulsion Lab.
THE 1978 STATE OF THE ART OF IN-USE ELECTRIC AND HYBRID VEHICLES
HS-027 231

California State Univ. at Chico, Dept. of Civil Engineering
ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

Centro de Tecnologia Promon-CTP, 22210 Rio de Janeiro, Brazil
WHICH ALCOHOL FUEL FOR BRASIL--METHANOL OR ETHANOL?
HS-027 226

Charles Stark Draper Lab., Inc., 555 Technology Square, Cambridge, Mass. 02139
A HIGH EFFICIENCY CONTROLLED SLIP INDUCTION MOTOR DRIVE FOR ELECTRIC VEHICLES
HS-027 237

Chevron Res. Co.
CARBURETOR DEPOSITS AND THEIR CONTROL
HS-027 180

Cornell Univ.
MODEL FOR NITRIC-OXIDE FORMATION IN A LARGE-BORE SPARK GAS ENGINE
HS-027 190

Daimler-Benz A.G., Germany
SOME SPECIAL FEATURES OF THE TURBOCHARGED GASOLINE ENGINE
HS-027 178

De Leuw, Cather & Co., Washington, D.C.
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

De Leuw, Cather and Co., San Francisco, Calif.
ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

Department of Energy, Washington, D.C. 20585
THE DEPARTMENT OF ENERGY ELECTRIC VEHICLE BATTERY PROGRAM: AN OVERVIEW
HS-027 240

Department of Justice, Federal Advisory Com. on False Identification, Washington, D.C. 20530
THE CRIMINAL USE OF FALSE IDENTIFICATION. A SUMMARY REPORT ON THE NATURE, SCOPE, AND IMPACT OF FALSE ID USE IN THE UNITED STATES WITH RECOMMENDATIONS TO COMBAT THE PROBLEM
HS-027 184

Dept. of Energy
ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

Dept. of Energy, Alternative Fuels Branch, Washington, D.C. 20585
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt e. V., Institut fur Technische Physik, 7000 Stuttgart 80, Federal Republic of Germany
CRYOGENIC HYDROGEN STORAGE AND REFUELING FOR AUTOMOBILES
HS-027 247

Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
ACCIDENT INVESTIGATION STUDIES IN CONJUNCTION WITH FMVSS (FEDERAL MOTOR VEHICLE SAFETY STANDARD) 301 COMPLIANCE TESTING. FINAL REPORT
HS-805 206

Eagle-Picher Industries, Joplin, Mo. 64801
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Empresa Brasileira de Planejamento de Transportes
PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

Energy Devel. Associates, Madison Heights, Mich. 48071
MODELING OF ZINC-CHLORIDE BATTERIES FOR ELECTRIC VEHICLES
HS-027 246

Energy Res. Group, Inc., 132 State St., Albany, N.Y. 12207
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Environmental Protection Agency
LIGHT DUTY AUTOMOTIVE FUEL ECONOMY....TRENDS THROUGH 1979
HS-027 308

Escher (Foster) Technology Associates, St. Johns, Mich.
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNOLOGY FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-027 248

ESB Technology Co., Yardley, Pa. 19067
EVALUATION OF BATTERY PERFORMANCE USING COMPUTER CONTROLLED TEST EQUIPMENT
HS-027 242

Federal Hwy. Administration
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

Federal Hwy. Administration, Washington, D.C. 20590
EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

Ford Motor Co., Environmental Res.
IN-SERVICE FUEL ECONOMY
HS-027 309

Ford Motor Co., Test Operations and Engineering Services
IDENTIFICATION, QUANTIFICATION AND REDUCTION OF SOURCES OF VARIABILITY IN VEHICLE EMISSIONS AND FUEL ECONOMY MEASUREMENTS
HS-027 313

General Electric Co., Corporate Res. and Devel., Schenectady, N.Y. 12301
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM
HS-027 229

General Motors Corp.
A FUEL ECONOMY DEVELOPMENT VEHICLE WITH ELECTRONIC PROGRAMMED ENGINE CONTROLS (EPEC)
HS-027 312

General Motors Corp., Delco Remy Div., Anderson, Ind.
THE DELCO REMY 5MT CRANKING MOTOR
HS-027 156

General Motors Corp., Engineering Staff
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

General Motors Corp., Oldsmobile Div.
DESIGN OF A FAST START GLOW PLUG CONTROL SYSTEM FOR DIESEL ENGINES
HS-027 300

General Res. Corp., Santa Barbara, Calif.
ELECTRIC CARS FOR URBAN TRANSPORTATION
HS-027 277

Gold Line Engineering, Power Wheel Div., P.O. Box 4102, Fullerton, Calif. 92634
WHEEL HUB MOTORS APPLIED TO ELECTRIC VEHICLE PROPULSION
HS-027 238

Goodell-Grivas, Inc., Southfield, Mich.
AUTOMATED COLLISION DIAGRAMS
HS-027 296

Goodell-Grivas, Inc., Southfield, Mich.
COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

Goodell-Grivas, Inc., Southfield, Mich.
PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

Greater Southwest Regional Planning Commission, Garden City, Kans.
IMPROVING TRAFFIC SAFETY IN RURAL KANSAS
HS-027 262

Highway Loss Data Inst., Watergate 600, Washington, D.C. 20037
AUTOMOBILE INSURANCE LOSSES, PERSONAL INJURY PROTECTION COVERAGES; CLAIM FREQUENCY RESULTS FOR 1977 AND 1978 MODELS
HS-027 163

Hoganas AB, PM-Process Devel., Sweden
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

Independent Consultant on Energy Policy, 425 E. 72nd St., New York, N.Y. 10021
IMPROVING OCTANE VALUES OF UNLEADED GASOLINE VIA GASOHOL
HS-027 227

Indiana State Police, Field Operations Section
OPERATION C.A.R.E. (COMBINED ACCIDENT REDUCTION EFFORT)
HS-027 253

Insurance Inst., for Hwy. Safety, Watergate 600, Washington, D.C. 20037
SMALL IMPORTS DOMINATE 'WORST CAR' LIST
HS-027 164

International Drivers' Behaviour Res. Assoc., c/o Organisme National de Securite Routiere, 2, Avenue du General Malleret-Joinville, F-94114 Arcueil Cedex, France
A FIFTEEN-COUNTRY STUDY OF SOME FACTORS INFLUENCING THE NUMBER AND THE SEVERITY OF ROAD ACCIDENTS. PT. 1. BACKGROUND FACTS AND STATISTICS (UNE ETUDE DANS QUINZE PAYS DE QUELQUES FACT●hHS-027 222 8007Japan Automobile Inst. Foundation HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON
HS-027 290

Japan Automobile Inst. Foundation
HEAD INJURY STUDIES. 1978 RESEARCH REPORT ON AUTOMOBILE SAFETY STANDARDS. SUMMARY
HS-027 222

Katholieke Universiteit te Leuven, Belgium
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

Kentucky Dept. of Transportation, Div. of Res., 533 South Limestone St., Lexington, Ky. 40508
CHARACTERISTICS OF BICYCLE-RELATED, MOTOR VEHICLE ACCIDENTS IN KENTUCKY
HS-027 148

Kentucky Dept. of Transportation, Lexington Div. of Res., 533 S. Limestone, Lexington, Ky. 40508
ANALYSIS OF WEEKDAY, WEEKEND, AND HOLIDAY ACCIDENT FREQUENCIES. INTERIM REPORT
HS-027 334

Littelfuse, Inc.
BLADE TYPE FUSES FOR ELECTRICAL CIRCUIT PROTECTION (AUTOMOTIVE APPLICATIONS)
HS-027 157

Los Alamos Scientific Lab., Los Alamos, N. Mex. 87545
APPLICATIONS OF FUEL CELLS IN TRANSPORTATION
HS-027 234

Loughborough Univ. of Technology, Leics., England
TRAVEL AND THE HANDICAPPED: A PROJECT SUMMARY
HS-027 284

M. H. Cameron and Associates, 17 Myrtle Grove, Blackburn, Vic. 3130, Australia
THE EFFECTIVENESS OF AUSTRALIAN DESIGN RULE 22 FOR HEAD RESTRAINTS
HS-027 273

THE EFFECT OF SEAT BELTS ON MINOR AND SEVERE INJURIES MEASURED ON THE ABBREVIATED INJURY SCALE
HS-027 274

Martini Engineering, Richland, Wash. 99352
A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

Mechanical Technology Inc., Stirling Engine Systems, 968 Albany-Shaker Rd., Latham, N.Y. 12110
CURRENT FREE-PISTON STIRLING ENGINE TECHNOLOGY AND APPLICATIONS
HS-027 249

Memphis State Univ., Dept. of Civil Engineering
DEVELOPMENT OF A TRAFFIC RECORDS SYSTEM FOR LOCAL JURISDICTIONS
HS-027 294

Midwest Res. Inst., Kansas City, Mo.
METHODS FOR IMPROVING ANALYSIS OF ROADSIDE SAFETY
HS-027 263

Midwest Res. Inst., 425 Volker Blvd., Kansas City, Mo. 64110
GUIDELINES FOR THE APPLICATION OF ARROW BOARDS IN WORK ZONES. FINAL REPORT
HS-027 283

National Hwy. Traffic Safety Administration, Technical Reference Branch, Washington, D.C. 20590
SCHOOL BUSES. A BIBLIOGRAPHY
HS-805 207

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
AUTOMOBILE INSPECTION, MAINTENANCE AND REPAIR CONFERENCE PROCEEDINGS. WASHINGTON, D.C., MAY 22-24, 1979
HS-804 912

CONSUMER ADVISORIES OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION 1970-1979, WITH INDEX
HS-805 234

VEHICLE DESIGN IS THE KEY TO LOW COST MAINTENANCE AND REPAIR
HS-810 366

National Science Teachers Assoc., Proj. for an Energy-Enriched Curriculum
TRANSPORTATION AND THE CITY, GRADES 8, 9. INTERDISCIPLINARY STUDENT/TEACHER MATERIALS IN ENERGY AND THE ECONOMY
HS-027 174

National Transportation Policy Study Commission, 2000 M St., N.W., Suite 3000, Washington, D.C. 20036
A COMPENDIUM OF FEDERAL TRANSPORTATION POLICIES AND PROGRAMS
HS-027 254

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
HIGHWAY ACCIDENT REPORT. CROSS-MEDIAN, MULTIPLE VEHICLE COLLISION AND FIRE, STATE ROUTE 2, NEAR CLEVELAND, OHIO, MAY 6, 1979
HS-027 223

HIGHWAY ACCIDENT REPORT. FORD COURIER PICKUP TRUCK, FIXED-OBJECT COLLISION, PATUXENT ROAD NEAR CROFTON, MARYLAND, APRIL 23, 1979
HS-027 266

Naval Surface Weapons Center, White Oak Lab., Silver Spring, Md. 20910
DEVELOPMENT OF A SELF-POWERED VEHICLE DETECTOR. FINAL REPORT
HS-027 177

Naval Weapons Center
ORIGIN AND STATUS OF THE DOE (DEPARTMENT OF ENERGY) HEAT EXCHANGER TECHNOLOGY PROGRAM TO IMPROVE ENERGY CONVERSION EFFICIENCY
HS-027 310

New England Inst. for Life Sciences, 125 Second Ave., Waltham, Mass. 02154
NITROSAMINES IN NEW AUTOMOBILES
HS-027 252

New York State Dept. of Motor Vehicles, Div. of Res. and Devel.
NEW YORK STATE ALCOHOL AND DRUG REHABILITATION PROGRAM. INTERIM EVALUATION
HS-027 268

Nippon Mining Co., Ltd.
THE EFFECTS OF FUEL COMPOSITION AND FUEL ADDITIVES ON INTAKE SYSTEM DETERGENCY OF JAPANESE AUTOMOBILE ENGINE
HS-027 181

Oakland County Road Commission, Mich.
ROADWAY-DRIVER COMPATIBILITY
HS-027 302

Office of Traffic Safety, American Samoa
AN ANALYSIS AND EVALUATION OF THE SELECTIVE TRAFFIC ENFORCEMENT PROGRAM IN AMERICAN SAMOA
HS-027 324

Olson Labs., Inc., 421 East Cerritos Ave., Anaheim, Calif. 92805
EXHAUST EMISSIONS FROM VEHICLES IN DEMAND-RESPONSIVE SERVICE
HS-027 255

Polytechnic Inst. of New York, Brooklyn, N.Y.
APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

CHANGING BASELINE IN TRANSPORTATION SAFETY: AN ASSESSMENT OF SOME KEY FACTORS
HS-027 260

TRANSPORTATION SAFETY INDEX APPLICABLE TO ALL MODES
HS-027 259

Princeton Univ., Mechanical and Aerospace Engineering Dept.
FURTHER COMPARISONS OF COMPUTED AND MEASURED DIVIDED-CHAMBER ENGINE COMBUSTION
HS-027 272

Research and Special Programs Administration, Cambridge, Mass.
SPARK IGNITION ENGINE FUEL ECONOMY CONTROL OPTIMIZATION--TECHNIQUES AND PROCEDURES
HS-027 154

Robert F. McAlevy 3rd. and Associates
PREDICTION OF VEHICLE PERFORMANCE AND ITS SENSITIVITY TO COMPONENT IMPROVEMENTS: APPLICATION TO ELECTRIC AND H2 (HYDROGEN)--FUELED VEHICLES
HS-027 228

Shell Res. Ltd., Thornton Res. Centre, Chester, England
USE OF A COUETTE HIGH-SHEAR-RATE VISCOMETER FOR MEASURING THE VISCOSITY OF ENGINE LUBRICANTS
HS-027 301

Sherwin-Williams Co., Chemical Coatings Div.
ORGANIC COATINGS FOR AUTOMOTIVE PLASTICS
HS-027 305

Shipley Co., Inc., Newton, Mass.
DURABILITY OF DECORATIVE ELECTROPLATED PLASTICS FOR EXTERIOR AUTOMOTIVE USE--A REVIEW
HS-027 304

Sigma Res., Inc., Richland, Wash. 99352
A THERMAL ENERGY STORAGE SYSTEM FOR A STIRLING ENGINE POWERED HIGHWAY VEHICLE
HS-027 230

South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
OLDSMOBILE OMEGA X-BODY BASELINE WEIGHT DATA. FINAL REPORT
HS-805 212

Southern California Res. Inst., Los Angeles, Calif.
AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

Southwest Res. Inst., Army Fuels and Lubricants Res. Lab., San Antonio, Tex.
A NOVEL LABORATORY METHOD FOR EVALUATING INDUCTION SYSTEM DEPOSITS IN GASOLINE ENGINES
HS-027 182

Sperry Systems Management, Great Neck, N.Y. 11020
THE EFFECTIVENESS OF REDUCED VISIBILITY GUIDANCE TECHNIQUES. STUDY. VOL. 1. FINAL REPORT
HS-027 149

USER GUIDELINES FOR REDUCED VISIBILITY SYSTEM DESIGN
HS-027 146

Stanford Res. Inst., Menlo Park, Calif. 94025
A CRITICAL LITERATURE REVIEW OF THE PROBLEM DRINKING BEHAVIOR IN SPECIAL POPULATION GROUPS. VOL. 1, EXECUTIVE SUMMARY FINAL REPORT
HS-027 335

A RESEARCH STRATEGY FOR REVIEWING THE PROBLEM DRINKING BEHAVIOR LITERATURE ASSOCIATED WITH SPECIAL POPULATION GROUPS. VOL. 2. FINAL REPORT
HS-027 336

Stanford Univ.
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

State Univ. of New York at Albany, Inst. for Traffic Safety Management and Res., 1400 Washington Ave., Albany, N.Y. 12222
ALCOHOL AND TRAFFIC SAFETY: A SELECT ANNOTATED BIBLIOGRAPHY
HS-027 139

State Univ. of New York Coll. at Fredonia, N.Y.
APPLICABILITY OF BEHAVIOR THEORY TO TRANSPORTATION
HS-027 261

Stirling Power Systems Corp., Ann Arbor, Mich.
A STIRLING ENGINE POWERED TOTAL ENERGY SYSTEM: RECREATIONAL VEHICLE APPLICATION
HS-027 250

Structural Dynamics Res. Corp., Milford, Ohio
FOUR STEPS FOR VEHICLE RIDE IMPROVEMENT
HS-027 306

Swedish National Devel. Co., Box 34, 184 00 Akersberga, Sweden
CURRENT DEVELOPMENT ACTIVITIES ON ELECTRIC VEHICLES IN EUROPE
HS-027 232

Systems Control, Inc.
DEVELOPMENT AND VALIDATION OF ENGINE MODELS VIA AUTOMATED DYNAMOMETER TESTS
HS-027 153

Systems Technology, Inc., Hawthorne, Calif.
AUTOMOBILE RESEARCH SIMULATORS: A REVIEW AND NEW APPROACHES
HS-027 293

Texaco Inc.
ASSESSMET OF SHEAR STABILITY METHODS FOR EUROPEAN ENGINE OILS
HS-027 303

Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 151

ASSESSMENT OF TECHNIQUES FOR COST-EFFECTIVENESS OF HIGHWAY ACCIDENT COUNTERMEASURES. FINAL REPORT
HS-027 152

Texas Res. and Devel. Foundation
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

PREDICTING TRAVEL TIME AND FUEL CONSUMPTION FOR VEHICLES ON LOW-VOLUME ROADS
HS-027 198

RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

THE EFFECT OF ROAD DESIGN AND MAINTENANCE ON VEHICLE OPERATING COSTS. FIELD RESEARCH IN BRAZIL
HS-027 195

Texas Transportation Inst., Transportation Systems Div.
CHANGEABLE MESSAGE SIGNS
HS-027 200

Thermo Electron Corp., Waltham, Mass. 02154
MULTI-FOIL INSULATION CONTAINER FOR ELECTRICAL VEHICLE APPLICATION OF A LITHIUM-ALUMINUM/METAL SULFIDE BATTERY
HS-027 245

Transport and Road Res. Lab., Access and Mobility Div., Crowthorne, Berks., England
CYCLE ROUTES IN PORTSMOUTH. 2--TRAFFIC STUDIES (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 285

CYCLE ROUTES IN PORTSMOUTH. 3--ATTITUDE SURVEYS (SPECIAL BICYCLE ROAD SYSTEM, ENGLAND)
HS-027 286

Transport and Road Res. Lab., UK
EFFECT OF SIMPLE ROAD IMPROVEMENT MEASURES ON VEHICLE OPERATING COSTS IN THE EASTERN CARIBBEAN
HS-027 192

Transport and Road Res. Lab., Vehicle Safety Div., Crowthorne, Berks., England
THE EDGE-LOCKING PERFORMANCE OF SOME SEAT BELT INERTIA REELS
HS-027 287

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
LOW-VOLUME ROADS: SECOND INTERNATIONAL CONFERENCE
HS-027 191

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
TRANSPORTATION SYSTEM SAFETY AND PROJECT ANALYSIS
HS-027 258

NEW TRANSPORTATION SYSTEMS AND TECHNOLOGY–1979
HS-027 276

SIMULATION TECHNOLOGY AND TRAFFIC ACCIDENT RECORDS SYSTEMS
HS-027 292

STATE RESOURCES FOR FINANCING TRANSPORTATION PROGRAMS
HS-027 299

Transportation Res. Board, 2101 Constitution Ave., Washington, D.C. 20418
CHANGEABLE MESSAGE SIGNS
HS-027 200

Transportation Systems Center, Cambridge, Mass. 02142
PERFORMANCE CHARACTERISTICS OF 1977 AMERICAN MOTORS 304 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 221

PERFORMANCE CHARACTERISTICS OF 1977 GENERAL MOTORS 350 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 222

PERFORMANCE CHARACTERISTICS OF 1977 CHRYSLER 318 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 223

SERVICE AND METHODS DEMONSTRATION PROGRAM. ANNUAL REPORT. EXECUTIVE SUMMARY (URBAN MASS TRANSPORTATION ADMINISTRATION)
HS-027 138

THE EFFECTS OF PRIMARY POWER TRANSMISSION LINES ON THE PERFORMANCE OF LORAN -C RECEIVERS IN EXPERIMENTAL TERRESTRIAL APPLICATIONS. FINAL REPORT
HS-027 333

Transportation Systems Center, Statistical Information Reporting Branch, Kendall Square, Cambridge, Mass. 02142
NATIONAL TRANSPORTATION STATISTICS. ANNUAL REPORT
HS-027 160

Trico Products Corp.
PLASTIC COMPONENTS FOR WINDSHIELD WIPER SYSTEMS
HS-027 179

U.S. Forest Service
A DURABLE REFLECTIVE SIGN SYSTEM FOR LOW-VOLUME ROADS
HS-027 194

University of California, Davis, Dept. of Civil Engineering
ANALYSIS OF BICYCLE DELAYS AT INTERSECTIONS AND CROSSINGS BY COMPUTER SIMULATION
HS-027 298

University of California, Lawrence Livermore Lab., Livermore, Calif.
FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
HS-027 188

A CRITIQUE OF THE THEORY FOR GUSSAC'S "LAG (AVALANCHE ACTIVATION OF COMBUSTION) PROCESS" ENGINE
HS-027 210

University of California, Lawrence Livermore Lab., Livermore, Calif. 94550
THE EFFECT OF MECHANICAL ENERGY STORAGE SYSTEMS ON THE CHARACTERISTICS OF ELECTRIC VEHICLES
HS-027 235

University of Cincinnati, Ohio
PARAMETER ESTIMATION TECHNIQUES FOR MODAL ANALYSIS
HS-027 307

University of Illinois at Urbana-Champaign
EXPLAINING SAFETY HELMET USE BY MOTORCYCLE OPERATORS USING A BEHAVIORAL INTENTION MODEL
HS-027 267

University of Maine-Orono, Orono, Maine 04473
EVALUATION OF TECHNIQUES FOR WARNING OF SLOW-MOVING VEHICLES AHEAD. FINAL REPORT
HS-027 150

University of Manchester, Inst. of Science and Tech., Manchester, United Kingdom
COMPUTER AIDED DESIGN PACKAGE FOR DIESEL ENGINE MANIFOLD SYSTEM
HS-027 314

University of Michigan, Ann Arbor, Mich. 48109
EFFECT OF DRIVER'S AGE ON NIGHTTIME LEGIBILITY OF HIGHWAY SIGNS
HS-027 275

University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
MICHIGAN PUBLIC OPINION TOWARD MOTOR VEHICLE INSPECTION. FINAL REPORT
HS-027 199

University of Southern California, Traffic Safety Center, Los Angeles, Calif.
COMMERCIAL VEHICLE ACCIDENT FACTORS
HS-027 297

University of Tennessee, Dept. of Civil Engineering, Knoxville, Tenn. 37916
SAFETY ASPECTS OF CURB PARKING. EXECUTIVE SUMMARY. FINAL REPORT
HS-027 158

SAFETY ASPECTS OF CURB PARKING. FINAL TECHNICAL REPORT
HS-027 159

University of Texas at Austin
RELATING VEHICLE OPERATING COSTS TO LOW VOLUME ROAD PARAMETERS IN BRAZIL
HS-027 196

University of Wisconsin, Coll. of Engineering, Madison, Wis. 53706
THE DESIGN OF AN ENERGY EFFICIENT HIGH PERFORMANCE HYBRID-ELECTRIC VEHICLE
HS-027 233

Urban Inst.
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS. A HANDBOOK FOR TRANSPORTATION PLANNERS. FINAL REPORT
HS-027 224

Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
THE EFFECTIVENESS OF WRITTEN DRIVER KNOWLEDGE TESTS
HS-027 211

USE OF TRAFFIC-CONFLICTS TECHNIQUE TO ASSESS HAZARDS OF TRANSPORTING OVERSIZE LOADS
HS-027 265

Volkswagenwerk A.G., Germany
NEW 5- AND 6-CYLINDER VW DIESEL ENGINES FOR PASSENGER CARS AND LIGHT DUTY TRUCKS
HS-027 183

Volkswagenwerk AG, Federal Republic of Germany
IMPACT OF EMISSION STANDARDS ON FUEL ECONOMY AND CONSUMER ATTRIBUTES
HS-027 311

Volkswagenwerk AG, Wolfsburg, Germany
AN ELECTRIC VEHICLE DRIVE CONCEPT USING A CENTRIFUGAL CLUTCH
HS-027 239

Volvo-Flygmotor AB, Technical Devel., Sweden
MACHINING STUDIES OF PM (POWDER METAL)-FORGED MATERIALS
HS-027 155

Wayne State Univ., Civil Engineering Dept., Detroit, Mich.
PROCEDURE FOR THE EVALUATION OF COMPLETED HIGHWAY-SAFETY PROJECTS
HS-027 264

Wayne State Univ., Detroit, Mich.
AUTOMATED COLLISION DIAGRAMS
HS-027 296

Wayne State Univ., Detroit, Mich.
COMPUTERIZED STREET INDEX FOR MICHIGAN ACCIDENT LOCATION INDEX SYSTEM
HS-027 295

Western Australia Main Roads Dept.
FUEL CONSUMPTION RELATED TO VEHICLE TYPE AND ROAD CONDITIONS
HS-027 197

Westinghouse Electric Corp., Res. and Devel. Center, 1310 Beulah Rd., Pittsburgh, Pa. 15235
A COMPARISON OF METAL-AIR BATTERIES FOR ELECTRIC VEHICLE PROPULSION
HS-027 241

Wharton Econometric Forecasting Associates, Inc., 4025 Chestnut St., Philadelphia, Pa. 19104
AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 1--THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 847

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 2--SIMULATION ANALYSIS USING THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 848

AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING OF THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES. VOL. 3--APPENDICES TO THE WHARTON E.F.A. (ECONOMETRIC FORECASTING ASSOCIATES) AUTOMOBILE DEMAND MODEL. FINAL REPORT
HS-804 855

Wilbur Smith and Associates, New Haven, Conn.
ASSESSMENT OF MARKET POTENTIALS FOR ELECTRIC VEHICLES
HS-027 278

blank page

Contract Number Index

ADM-281-76-0025
Stanford Res. Inst., Menlo Park, Calif. 94025
HS-027 335

Stanford Res. Inst., Menlo Park, Calif. 94025
HS-027 336

AL-77-001
New York State Dept. of Motor Vehicles, Div. of Res. and Devel.
HS-027 268

ANL-31-109-38-3983
Sigma Res., Inc., Richland, Wash. 99352; Martini Engineering, Richland, Wash. 99352
HS-027 230

ANL-31-109-38-4123
Eagle-Picher Industries, Joplin, Mo. 64801; Thermo Electron Corp., Waltham, Mass. 02154; Budd Technical Center, Fort Washington, Pa. 19034
HS-027 245

DOE-EX-76-C-10-3841
National Science Teachers Assoc., Proj. for an Energy-Enriched Curriculum
HS-027 174

DOT-FH-11-8879
University of Tennessee, Dept. of Civil Engineering, Knoxville, Tenn. 37916
HS-027 158

University of Tennessee, Dept. of Civil Engineering, Knoxville, Tenn. 37916
HS-027 159

DOT-FH-11-9189
Sperry Systems Management, Great Neck, N.Y. 11020
HS-027 149

DOT-FH-11-9243
Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
HS-027 151

Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
HS-027 152

DOT-FH-11-9245
Federal Hwy. Administration, Washington, D.C. 20590; University of Maine-Orono, Orono, Maine 04473
HS-027 150

DOT-FH-11-9352
Midwest Res. Inst., 425 Volker Blvd., Kansas City, Mo. 64110
HS-027 283

DOT-FH-9189
Sperry Systems Management, Great Neck, N.Y. 11020
HS-027 146

DOT-HS-6-01478
Dynamic Science, Inc., 1850 West Pinnacle Peak Rd., Phoenix, Ariz. 85027
HS-805 206

DOT-HS-9-02111
South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, Calif. 93105
HS-805 212

DOT-TSC-1072
Wharton Econometric Forecasting Associates, Inc., 4025 Chestnut St., Philadelphia, Pa. 19104
HS-804 847

Wharton Econometric Forecasting Associates, Inc., 4025 Chestnut St., Philadelphia, Pa. 19104
HS-804 848

Wharton Econometric Forecasting Associates, Inc., 4025 Chestnut St., Philadelphia, Pa. 19104
HS-804 855

DOT-UT-20019
De Leuw, Cather & Co., Washington, D.C.; Urban Inst.; Federal Hwy. Administration
HS-027 224

E-P-FC66337
Eagle-Picher Industries, Joplin, Mo. 64801; Thermo Electron Corp., Waltham, Mass. 02154; Budd Technical Center, Fort Washington, Pa. 19034
HS-027 245

EPA-68-02-2664
Arthur D. Little, Inc.; Cornell Univ.
HS-027 190

EPA-68-03-2411-T.O.-3
Olson Labs., Inc., 421 East Cerritos Ave., Anaheim, Calif. 92805
HS-027 255

ERDA-P.O.-EC-77-X-01-2752
Escher (Foster) Technology Associates, St. Johns, Mich.; Dept. of Energy, Alternative Fuels Branch, Washington, D.C. 20585
HS-027 248

FHWA-P.O.-6-3-0180
Naval Surface Weapons Center, White Oak Lab., Silver Spring, Md. 20910
HS-027 177

KYP-75-73
Kentucky Dept. of Transportation, Lexington Div. of Res., 533 S. Limestone, Lexington, Ky. 40508
HS-027 334

KYP-76-80
Kentucky Dept. of Transportation, Div. of Res., 533 South Limestone St., Lexington, Ky. 40508
HS-027 148

MVI-79-001A
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
HS-027 199

NHTSA-PPA-HS027
Transportation Systems Center, Cambridge, Mass. 02142
HS-805 221

Transportation Systems Center, Cambridge, Mass. 02142
HS-805 222

Transportation Systems Center, Cambridge, Mass. 02142
HS-805 223

NSF-ENV75-20802
New England Inst. for Life Sciences, 125 Second Ave., Waltham, Mass. 02154
HS-027 252

Ref: DOE-EY-76-C-02-4010
General Electric Co., Corporate Res. and Devel., Schenectady, N.Y. 12301
HS-027 229

UC-LLL-P.O.-1858109
Robert F. McAlevy 3rd. and Associates
HS-027 228

UC-LLL-P.O.-2122409
Robert F. McAlevy 3rd. and Associates
HS-027 228

UC-LLL-8990503
General Electric Co., Corporate Res. and Devel., Schenectady, N.Y. 12301
HS-027 229

W-7405-ENG-48
University of California, Lawrence Livermore Lab., Livermore, Calif.
HS-027 188

University of California, Lawrence Livermore Lab., Livermore, Calif.
HS-027 210

Report Number Index

replaces PB-233 580/AS HS-027 224

ACS-799065 HS-027 226

ACS-799066 HS-027 227

ACS-799076 HS-027 228

ACS-799077 HS-027 229

ACS-799098 HS-027 230

ACS-799120 HS-027 231

ACS-799121 HS-027 232

ACS-799123 HS-027 233

ACS-799124 HS-027 234

ACS-799125 HS-027 235

ACS-799126 HS-027 236

ACS-799127 HS-027 237

ACS-799128 HS-027 238

ACS-799129 HS-027 239

ACS-799130 HS-027 240

ACS-799134 HS-027 241

ACS-799136 HS-027 242

ACS-799137 HS-027 243

ACS-799138 HS-027 244

ACS-799139 HS-027 245

ACS-799145 HS-027 246

ACS-799160 HS-027 247

ACS-799164 HS-027 248

ACS-799246 HS-027 249

ACS-799250 HS-027 250

AD-A068 136 HS-027 165

CR-4 HS-027 274

CR-5 HS-027 273

DOE/IR/3841-3-Rev. HS-027 174

DOT-TSC-NHTSA-79-49-Vol-1 HS-804 847

DOT-TSC-NHTSA-79-49-Vol-2 HS-804 848

DOT-TSC-NHTSA-79-49-Vol-3 HS-804 855

DOT-TSC-NHTSA-80-10 HS-805 221

DOT-TSC-NHTSA-80-11 HS-805 222

DOT-TSC-NHTSA-80-12 HS-805 223

DOT-TSC-RSPA-79-19 HS-027 160

DOT-TSC-RSPA-79-8 HS-027 333

DSI-3005-79-151/1505 HS-805 206

EPA-460/3-78-004 HS-027 255

FHWA-Implementation-Package-79-2 HS-027 146

FHWA-RD-78-115 HS-027 149

FHWA-RD-79-52 HS-027 151

FHWA-RD-79-53 HS-027 152

FHWA-RD-79-58 HS-027 283

FHWA-RD-79-75 HS-027 158

FHWA-RD-79-76 HS-027 159

FHWA-RD-79-79 HS-027 150

FHWA-RD-79-89	HS-027 177
HLDI-I-78-1	HS-027 163
HPR-PL-1(14)-Part-3-B	HS-027 148
IEEE-79CH1477-9-ENERGY-Vol-1	HS-027 225
IEEE-79CH1477-9-ENERGY-Vol-2	HS-027 251
MRI-4463-D	HS-027 283
NCHRP-Synthesis-61	HS-027 200
NCHRP-Synthesis-62	HS-027 299
NIAAA/NCALI-79-09	HS-027 335
NIAAA/NCALI-79-10	HS-027 336
NSWC/WOL-TR-78-177	HS-027 177
NTPSC/SR-79-06	HS-027 254
NTSB-HAR-79-6	HS-027 266
NTSB-HAR-79-7	HS-027 223
PA525/78	HS-027 192
PB-292 486	HS-027 255
PB-294 454	HS-027 254
PB-295 690	HS-027 334
PB-296 501	HS-027 335
PB-296 502	HS-027 336
PB80-143316	HS-804 847
PB80-144124	HS-805 207
PB80-145329	HS-805 212
PB80-146723	HS-805 206
PB80-155336	HS-805 223
PB80-155484	HS-805 221
PB80-165608	HS-804 848
PB80-166580	HS-804 855
PB80-170012	HS-805 222
RR-498	HS-027 148
RR-513	HS-027 334
SAE-790178	HS-027 153
SAE-790179	HS-027 154
SAE-790192	HS-027 155
SAE-790195	HS-027 156
SAE-790199	HS-027 157
SAE-790201	HS-027 179
SAE-790202	HS-027 180
SAE-790203	HS-027 181
SAE-790204	HS-027 182
SAE-790206	HS-027 183
SAE-790207	HS-027 178
SAE-790208	HS-027 300
SAE-790212	HS-027 301
SAE-790214	HS-027 303
SAE-790215	HS-027 304
SAE-790216	HS-027 305
SAE-790219	HS-027 306
SAE-790221	HS-027 307
SAE-790225	HS-027 308

AE-790227 HS-027 309
AE-790230 HS-027 311
AE-790231 HS-027 312
AE-790232 HS-027 313
AE-790247 HS-027 272
AE-790248 HS-027 188
AE-790249 HS-027 210
AE-790250 HS-027 310
AE-790277 HS-027 314
AE-790293 HS-027 190
AE-790298 HS-027 302
B-39 HS-805 207
RI-URU-5580-Vol-1 HS-027 335
RI-URU-5580-Vol-2 HS-027 336
SM-GF-3704-1055 HS-027 149
M-1-79 HS-027 165
RR-702 HS-027 191
RR-706 HS-027 292
RR-708 HS-027 276
RR-709 HS-027 258
RRL-LR-874 HS-027 285
RRL-LR-875 HS-027 286
RRL-LR-882 HS-027 287
RRL-SR-480 HS-027 284
SSB-02-0779 HS-027 139
UM-HSRI-79-52 HS-027 275
UM-HSRI-79-60 HS-027 199
UMTA-IT-06-0049-79-1 HS-027 224
UMTA-MA-06-0049-79-7 HS-027 138
VHTRC-79-R41 HS-027 211
79-04-30-033 HS-027 165

U.S. GOVERNMENT PRINTING OFFICE: 1981 — 341-452:104

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TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

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ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number	HS-013 124
Title of document	**MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**
Abstract	The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.
Personal author(s)	by C. R. VonBuseck
Corporate author (or author's affiliation)	General Motors Corp.
Publication date; pagination	1973? ; 18p
Supplementary note	Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability	Availability: Corporate author

NHTSA accession number	HS-018 924
Title of document	**NATURAL FREQUENCIES OF THE BIAS TIRE**
Abstract	The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.
Personal author(s)	by Masami Hirano; Takashi Akasaka
Journal citation	Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date	1976; 6refs
Availability	Availability: See publication

HS-027 338

DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS

Data from an ongoing model validation program for dispersion of pollutants from roadways in Texas were obtained from experimental sites. A schematic diagram of instrumentation layout at a typical site is shown. These data indicate that pollutant concentrations do not increase as rapidly with decreasing wind speed as predicted by most models which are based on a gaussian formulation. In fact, the actual ground level concentration may decrease with decreasing wind speed when the speed drops below some critical value. A model is needed to predict the dispersion of pollutants from roadways at low wind speeds and stable atmospheric conditions. The line source dispersion model developed by D.P. Chock should serve as a guide to the improvements needed: refining the dispersion parameter, incorporation of buoyant plume rise at low wind speeds, and consideration of traffic induced turbulence. The resulting model may not have the form of the present gaussian expression.

by Nicholas J. Green; Jerry A. Bullin; John C. Polasek
Publ: Journal of the Air Pollution Control Association v29 n10 p1057-61 (Oct 1979)
1979 ; 15refs
Sponsored by Texas State Dept. of Highways and Public Transportation and Federal Hwy. Administration.
Availability: See publication

HS-027 339

ALL LIT UP: ELECTRONIC BREATH TESTERS SOON

The two conventional breath testers (crystal-filled tube-with-bag) in use by the British police, Alcotest and Alcolyser, are being supplemented experimentally by a new electronic device known as Alcometer SL2. From 1 Dec 1979, it will be used for a year by police in Sussex and West Yorkshire, England. As a control, half the breath tests in each area will be conducted with the old devices. Among the advantages claimed for the Alcometer SL2 are greater accuracy (over the plus/minus 10% accuracy of the old testers), improved readability, and ease and speed of operation. The new device costs 110 pounds, vs. 50 pence for each of the conventional disposable breathalyzers. With the new device, the subject blows into a mouthpiece, and a light on the unit indicates an adequate sample and signals the correct moment to take a reading. The result is displayed on three LED's on the front of the Alcometer: red representing more than 80 mg; red and amber, 70 to 80 mg; amber, 5 to 70 mg; and green, less than 5 mg.

Publ: Autocar v151 n4327 p18 (13 Oct 1979)
1979
At head of title: AutoView.
Availability: See publication

HS-027 340

PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)

Plastics were introduced in the U.S. automotive industry in the 1950's and today are increasingly attractive in a variety of automotive applications. Although plastics cannot match metal components in the speed of forming or shaping, tremendous progress has been made in its strength, appearance, and versatility. Plastic can often be formed into much more complex shapes in a single operation than metal can. Today, many parts of new cars are made out of plastics (e.g. fenders, panels between body and bumpers, grilles, moldings, interior components). Plastics growth is expected to increase with the 1981 model year, when new body panels and structural components are approved. By the 1981 or 1982 model year, some hoods, deck lids, station wagon tailgates, sliding van doors, and passenger car doors may be made of plastic. Other potential applications include all-plastic car windows, wheels and wheel covers, and fuel tanks. To the automotive industry, plastics promise cost savings, weight reduction, energy conservation, and corrosion resistance. To the car buyer, they offer improved fuel economy, better design, and fewer maintenance problems.

by Ed Janicki
Publ: Autobody and the Reconditioned Car v58 n10 p18, 20, 22 (Oct 1979)
1979
Availability: See publication

HS-027 341

SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG

The design of a unique automobile body shape with an aerodynamic drag coefficient of 0.201 is described. The design, product of collaboration between Alberto Morelli of Turin Polytechnical Univ., Italy, and the Italian auto design firm Pininfarina, is based on a method formulated by Morelli in 1963 for determining the lowest-drag shape for a given volume. Morelli developed a computer program which considered all mechanical components and legal requirements and provided realistic passenger and cargo space with minimum aerodynamic drag. A full-size mockup of the final shape has been constructed, representing a buildable, real-world, four-door sedan, with room for four adults and a reasonable-size trunk. The car has an arched roofline and raised door sills. It has no real hood; the windshield base has been pushed forward almost to the front-wheel axis, and front overhang is minimal. The tail is sharply cut off where the roofline joins the beltline. The drag coefficient of 0.201 translates into a 30% lower fuel consumption at constant 60 mph and at least 15% higher mpg in mixed driving, than the average car. This streamlined shape meets the main design target of low aerodynamic drag, while providing high directional stability.

by Jan P. Norbye
Publ: Popular Science v215 n5 p72-5 (Nov 1979)
1979
Sponsored by National Res. Council, Italy.
Availability: See publication

HS-027 342

IDEAL POLICE CAR, 1978 TECHNICAL REPORT, 2ND ED.

Information is provided to assist in the selection of police vehicles to meet the particular needs of the user. Rather than focusing on a single vehicle, the report concentrates on several selected elements, in order to make the reader more aware of current technology, of progress in other cities, and of government research. In a review of the state-of-the-art, the work of a Law Enforcement Standards Lab. is described in which evaluation and testing of police equipment has resulted in several documents on such topics as terms and definitions of patrol cars, economic efficiency, sirens and other warning devices, light systems, radial tires, and life cycling costs. Detailed discussions of police vehicle components include engine, brakes, suspension, tires, interior, and warning system. Compact vs. full-size police vehicles are compared. Information for obtaining police vehicle studies is provided, as well as a list of criteria to be used in writing specifications for an ideal vehicle.

Denver Urban Observatory, Technological Innovation Center, Box A097 University Center, 4200 East Ninth Ave., Denver, Colo. 80220
ISR-75-22829
Rept. No. NSF/RA-780610; PB-296 209 ; 1978 ; 32p 6refs
Sponsored by National Science Foundation.
Availability: NTIS

HS-027 343

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS

The Chicago Area Expressway Surveillance Project is reported on. The system moves more than 250,000 vehicles daily to log 14 million vehicle miles in a 24-hr period. A ramp control procedure begun in 1963 provides 54 stations which operate during the peak periods, keeping entry to the expressway spaced to maintain a steady flow of traffic. The "controller" is located in the surveillance system center; ramp signal changes are transmitted from the central location to the field. Service requirements for all phases of the operation are minimal; the chief maintenance problem is an occasional cabinet knockdown. The effectiveness of the system is significantly increased by the work of the Emergency Patrol, or "Minute Men," 50 men with 39 emergency patrol vehicles and 3 heavy duty wreckers, who are on 24-hr duty to aid stranded motorists. The Patrol is under the jurisdiction of the Illinois Dept. of Transportation, as is the entire traffic control system. Cost for the 105 controlled miles, with 1,600 detectors and over 60 metered ramps, has been less than $8 million. Besides reductions in accidents and congestion, the steady traffic flow provides a reduction in gas consumption estimated at 4.5 million gallons.

Publ: Better Roads v49 n10 p18-9 (Oct 1979)
1979
Third in a series on traffic control systems
Availability: See publication

HS-027 344

FALLING ON DEAF EARS? (NOISE REGULATIONS)

Tighter noise limitations for vehicles will be imposed in the near future, but engineers fear a blanket reduction in legal noise limits would confront car designers with impractically low limits. Sound as measured by instruments differs from what is perceived by the human ear; the difference between a just-audible sound and a deafeningly loud one is best measured on a logarithmic scale, using decibels. Because the human ear is more sensitive to the range 500-5,000 Hertz, a special scale adjustment places more emphasis on frequencies which are heard best; the one used in work with cars is the "A" scale. A daily level of 80dB(A) will not cause appreciable deafness in the average lifetime; the present limit on passenger cars is 84dB(A), and 86dB(A) on large motorcycles. The 92dB(A) limit for heavy goods vehicles with engines over 200bhp is in a range causing partial deafness in from 2 to 20 years. It is feared that if limits are imposed on an all-round basis, by the time trucks are made reasonably quiet, the limitation on passenger cars will be counter-productive. Suppression of sound is more difficult than insulating the environment against it. Putting engines in insulated boxes might cut down external engine noise while increasing noise inside the car and causing weight and heat problems. Economy engines with lower revving rates should generate less engine and possibly less exhaust noise, but higher compression ratios could have the opposite effect. Exhaust noise can be cut, but at the expense of weight, first cost and engine efficiency. The wet grip of tires may suffer if treads are altered to diminish tire noise. Aerodynamic noise may be improved by the lower-drag body designs being considered in the economy drive. The difficulty of locating the exact source of a noise in a vehicle, and deciding how serious it is, leads to disagreement among drivers and engineers. In legislation, a careful balance must be struck between noise reduction and cost as a whole.

by Jeffrey Daniels
Publ: Autocar v151 n4323 p50-3 (15 Sep 1979)
1979
Availability: See publication

HS-027 345

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES

The frictional and controlled oil leakage characteristics of valve stem seals were experimentally investigated by applying the inverse problem of hydrodynamic lubrication, and equations were derived for expressing these characteristics. It was determined that the frictional characteristics of valve stem seals are similar to those of other seals for reciprocating motion (i.e. O-rings, U-seals, and lip-type oil seals). The value of a nondimensional duty parameter at the point the lubrication state changes from hydrodynamic to nonhydrodynamic is closely related to the shape of seal edge and shaft surface roughness. Since controlled-leakage characteristics depend on the contact pressure distribution, the required characteristics can be obtained by varying the pressure distribution.

by Hiroshi Hirabayashi; Yoshio Kawahara; Yoshitaka Muto; Susumu Iida
Nippon Oil Seal Industry Co., Ltd., Japan; NOK-USA, Inc.
Rept. No. SAE-790350 ; 1979 ; 12p 9refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 346

AM GENERAL/M.A.N. ARTICULATED BUS

An articulated bus is described which was modified from its originally European configuration to comply with all U.S. regulations and specific customer requirements. Detailed descriptions of the bus, its dimensions, performance, and its components are presented, emphasizing the specific aspects of an articulated bus: the underfloor drive train, articulation joint and braking system. The structure, electrical system, interior and air-conditioning system are also outlined and illustrated by photographs and diagrams. As of Nov 1978, approximately 100 buses have been delivered to four U.S. properties and put into revenue service; 300 additional buses are in production for Spring 1979 delivery to seven additional customers.

by G. W. Scharbach; H. Domandl
AM General Corp.; Maschinenfabrik Augsburg-Nuernberg Aktiengesellschaft
Rept. No. SAE-790304 ; 1979 ; 16p
Presented at Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 347

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY

The application of a hydraulic pump/motor and hydro-pneumatic energy-storage is described as a supplement to the conventional internal combustion engine in a city bus. A mathematical model of a hydraulic hybrid vehicle was developed, based on empirical models of the main components, and used to study potential fuel savings. Three different strategies for controlling the energy flow in the hybrid vehicle according to the actual driving pattern were developed; by appropriate matching of control and strategy and the component sizes used, a fuel saving of 10% to 30% could be obtained. Of the three control strategies, the On-Off Control was preferred to the "Best-Efficiency" Control because it was simpler to apply and gave the same fuel saving potential. It was also preferred to the "Constant Engine Torque" Control Strategy for simplicity reasons. An experiment with a model hydraulic hybrid vehicle, a converted Ford Escort Van, showed that the measured fuel saving (using the On-Off Control strategy) was in close agreement with the theoretical fuel saving calculated with the mathematical model. Mathematical models of the hybrid vehicle components are appended.

by P. Buchwald; G. Christensen; H. Larsen; P. Sunn Pedersen
Technical University of Denmark, Lab. for Energetics
Rept. No. SAE-790305 ; 1979 ; 18p 19refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Sponsored in part by Danish Council of Technology.
Availability: SAE

HS-027 348

CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS

The effects accruing from the choice of precious metals and their relative ratios are considered in catalyst systems used in VW and Audi cars under open loop conditions and dynamic closed loop controlled engine conditions in conjunction with an exhaust gas oxygen sensor. The best catalyst system for three-way activity found when comparing major manufacturer technologies was the three-way system Pt/Rh ● 5:1, which was introduced in two 1979 engine families sold in Calif., VW microbus and Audi 5000. Also discussed are the relationship between the selectivity window and the oxygen sensor characteristic, improvements in substrate development, and novel emission control concepts, including metal supported catalysts and catalysed exhaust pipes for the improvement of warm-up. A detailed description of a method of assessing closed loop metering systems is appended.

by Polat Oser
Volkswagenwerk AG
Rept. No. SAE-790306 ; 1979 ; 16p 12refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 349

A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES

The emissions of hydrocarbons (HC) and carbon monoxide (CO) from a vehicle can be decreased by obtaining faster warmup of the catalytic converter. An experimental study of effective internal insulation of an exhaust pipe has demonstrated a significant increase in converter-inlet gas temperature during warmup, and a lowering of HC and CO emissions on the Federal Test Procedure (FTP) by about 15% on one particular vehicle. Such insulation would be especially beneficial where the temperature of the exhaust gas entering the converter stays very near the catalyst lightoff temperature during the early portions of the FTP. A mathematical model has been developed and verified to predict converter-inlet temperature histories from known exhaust-takedown temperature histories and to quantify the effects of various insulation material properties on the temperature of the gas entering the converter. Agreement is good between the predicted and measured exhaust gas temperatures in uninsulated exhaust pipes and in exhaust pipes internally insulated with either a fibrous moist-pack or a ceramic insulation. The dangers of drawing misleading conclusions from tests of exhaust pipe insulation are discussed.

by Gerald F. Robertson
General Motors Res. Labs.
Rept. No. SAE-790307 ; 1979 ; 14p 10refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 350

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES

To optimize the design and calibration of an engine, it is important to know the relation between the exhaust gas temperature and the engine parameters. A series of tests were done on six different engines. The engine speed, load, spark timing, air fuel ratio and exhaust gas recirculation ratio were chosen for the calibration parameters, and the compression ratio, valve overlap timing, engine displacement, and number of cylinders were among the design parameters chosen. The data were analyzed statistically and the experimental equation was derived for estimating the exhaust gas temperature. The analytic process is given, with some applications.

by K. Goto; M. Yamada; T. Hirayama; K. Saito; N. Tokoro
Toyota Motor Co., Ltd.
Rept. No. SAE-790308 ; 1979 ; 16p 2refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 351

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE

An experimental system was constructed to study the heat transfer processes in the straight section of the exhaust port of a four-stroke, 325 cc air-cooled two-cylinder spark ignition engine. The effects of engine variables on the steady-state heat transfer rates was studied at four locations in the exhaust port. It was found that the heat transfer rates have a significant dependence on their location within the exhaust port. Data were correlated in the form of a Nusselt-Reynolds number relationship for local and spatially averaged steady-state heat transfer. It is shown that the use of conventional steady-state heat transfer relationships for developing steady-state turbulent flow in pipes predicts heat transfer rates which are lower than those experimentally observed. It was found unnecessary to introduce engine speed parameters into the correlation of time-averaged heat transfer rates, since the results can be correlated using mass flow rate through the engine, independent of engine speed.

by G. L. Malchow; S. C. Sorenson; R. O. Buckius
University of Illinois at Urbana-Champaign, Dept. of
Mechanical and Industrial Engineering, Urbana, Ill.
DAAG-29-76-G-0265
Rept. No. SAE-790309 ; 1979 ; 12p 8refs
Presented at the Congress and Exposition, Detroit, 26 Feb-2
Mar 1979.
Availability: SAE

HS-027 352

INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN

The effect of various acoustic treatments on interior noise levels of a 3/4 ton van was determined. The base vehicle was a 1978 Chevrolet van with a 125-inch wheel base. It was equipped with factory-supplied radial tires and access doors at rear and passenger sides. Noise measurements were conducted under typical highway conditions, with the vehicle in two different running modes. The first test was made with the vehicle idling in drive in a parking lot. The lot surface was asphalt, no reflecting surfaces were close to the vehicle, no exterior noise sources were present, and the engine was operating at a low idle speed. The vehicle was then operated at a constant 55 mph on an interstate highway with a dry concrete surface. Care was taken to insure that passing vehicles did not affect interior noise levels. For all noise measurements, windows were closed, heating and air conditioning fans were off, and extraneous accessories which could rattle were removed. Acoustic levels were determined at the operator's right ear and in the van's rear, three feet above the floor surface and at the rear axle's midpoint. Acoustic materials used in testing were dampers, barriers, and absorbers. Results showed that principal noise sources in a closed van during typical highway conditions are tires and the differential gearbox. This noise is radiated through the vehicle floor into the reverberant van interior. The addition of barrier materials to the floor reduced noise from these sources. A considerable amount of low-frequency noise is probably due to body flexure and resonance caused by the correspondence of van dimensions and the wavelength of low-frequency noise. Absorbing materials reduce this noise by adding absorption at highly-resonant fundamental frequencies. Further reductions in van noise can probably be achieved by using a heavier floor barrier and by increasing low-frequency absorption. A noise reduction of up to 10 dBA was demonstrated for certain barrier and absorber combinations.

by E. J. O'Keefe
Specialty Composites Corp.
Rept. No. SAE-790310 ; 1979 ; 7p 2refs
Presented at the SAE Congress and Exposition, Detroit, 26
Feb-2 Mar 1979.
Availability: SAE

HS-027 353

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE

Ford's 2.3-liter turbocharged engine program was designed to develop a system with a 0-60 mph performance capability of 9.4 seconds, to demonstrate the feasibility of turbocharing in an emission and fuel economy environment, and to gain production experience with a turbocharged engine system. The turbocharged engine and powertrain were specifically developed to match the 1979 Mustang and Capri, to provide consumers with excellent vehicle performance and good fuel economy and drivability. After establishing the basic system, certain areas were investigated to optimize engine/vehicle performance: turbocharger sizing and matching; exhaust system; camshaft; axle ratio and transmission gear ratios; fuel requirements; and spark requirements. Ignition system testing to insure reliable operation in a turbocharged environment encompassed reserve voltage capacity, flash-over reliability, radio frequency interference, heat range selection, and spark plug gap selection and maintenance interval. Dynamometer testing was conducted to evaluate the integrity of the basic engine system. Vehicle testing was performed to evaluate the entire powertrain system's integrity and to demonstrate compliance with Environmental Protection Agency emission standards. Durability testing was also conducted. The relatively high compression ratio was retained from the naturally-aspirated engine to preserve low-end manual transmission vehicle performance before turbocharger boost. It is concluded that good turbocharged engine transient response can be achieved by proper design and extensive development work and that the 2.3-liter engine's structural integrity accommodates turbocharged applications with no required revisions to major components (block, cylinder head, crankshaft, and connecting rods). The engine cooling system was modified by a heavy-duty radiator with increased thickness and fin density and a higher capacity fan. Other engine components changed in design or material include a one-piece cast aluminum intake manifold, new cylinder head gasket, intake and exhaust valves, piston and ring package, piston to bore clearance, and the main and connecting rod bearings. A new stainless steel crossover pipe, new downpipe and exhaust gas recirculation tube were added to the exhaust manifold. Fundamentals of basic turbocharing are described and illustrated.

by H. H. Dertian; G. W. Holiday; G. W. Sanburn
Ford Motor Co.
Rept. No. SAE-790312 ; 1979 ; 28p 1ref
Presented at the SAE Congress and Exposition, Detroit, 26
Feb-2 Mar 1979.
Availability: SAE

HS-027 354

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE

A model was developed to simulate the combustion process in a spark ignition engine that considers combustion chamber geometry, piston face profile, and spark plug location. One-dimensional unsteady analysis of turbulent flame propagation determined the heat release rate. Chemical kinetic analysis predicted nitric oxide (NO) emission level as a function of time and chamber position, and equilibrium calculation was made of carbon monoxide (CO) emission level at the end of the combustion process. A computer program was established to solve the flame propagation and kinetic equation, with results verified by comparing such experimental data as flame velocity, combustion duration, mass fraction of burned gas versus crank angle, rate of pressure rise, and NO and CO emission levels. Results predicted by the model are in relatively good agreement with experimental results. In a study to investigate the effect of spark plug location on combustion duration, flame velocity, and NO and CO emission levels, it was shown that flame speeds reach a maximum value as the air-fuel ratio is approximately 10% richer than the stoichiometric ratio and that they decrease at higher or lower air-to-fuel ratios. Flame speeds of engines with concentric spark plug locations are faster than those of engines with eccentric spark plug location. NO levels reach a maximum value at an air-fuel approximately 10% leaner than stoichiometric, decreasing at higher or lower values; CO levels tend to decrease with increasing air-fuel ratio, reaching a minimum value at about 0.85 equivalence ratio. It is anticipated that the model will be useful in design studies directed toward improving efficiency and pollution characteristics of internal combustion engines. Supporting equations are appended.

by Trilochan Singh; Kosol Surakomol
Wayne State Univ., Mechanical Engineering Dept., Detroit, Mich.; Ford Motor Co., Dearborn, Mich.
Rept. No. SAE-790354 ; 1979 ; 23p 28refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 355

A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE

A model has been formulated to simulate combustion in a three-valve stratified-charge spark ignition engine. Conservation equations for mass, momentum, chemical species, and energy are numerically integrated for a one-dimensional flame using an empirical model for turbulent diffusivity. The chemical reaction of fuel and air is modeled using simple kinetics in a one-step reaction, and experimentally determined ignition delays are employed. Nitric oxide emissions are calculated with the aid of a simple Zeldovich model characterized by steady-state atomic nitrogen and equilibrium atomic oxygen. Suggested refinements to the model concern heat transfer; evaluation of chemical kinetics and diffusivity over a wide range of speeds, loads, and nozzle diameters; and ignition delay or flame kernel development. Effects of various assumptions and parameters in the model are discussed, and the model is compared with experimental data from a single-cylinder engine. Conservation equations for the one-dimensional model are appended.

by S. C. Sorenson; S. S. Pan
University of Illinois at Urbana-Champaign, Mechnical and Industrial Engineering Dept., Urbana, Ill. 61801
Rept. No. SAE-790355 ; 1979 ; 20p 33refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 356

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES

The flow field in an axisymmetric reciprocating internal combustion engine is calculated as a function of space and time throughout the complete four-stroke cycle. Calculations are based on a procedure that solves governing partial differential equations on a mesh which expands and contracts with piston motion. The importance of intake and exhaust generated turbulence is compared with that of turbulence due to piston motion. Turbulent kinetic energy generated by the piston at the walls is smaller than turbulence generated at the intake. Piston turbulence is caused by the action of shear stress. Compressibility effects appearing in Reynolds stresses, turbulent kinetic energy, and its dissipation rate are small since the mean flow Mach number is small. Numerical results for laminar flow show the formation of a large vortex during the intake stroke. As fluid is compressed, vortex intensity decays and this decay persists throughout most of the expansion stroke. Numerical results for turbulent flow demonstrate that turbulence during the intake stroke is due to shear layers on the sides of the incoming air jet; it is then convected and diffused through the cylinder. Further experimental work is recommended to explore intake and exhaust conditions, unsteady and compressible situations, and heat transfer and temperature profiles. Supporting equations are appended.

by J. I. Ramos; J. A. C. Humphrey; W. A. Sirignano
Princeton Univ. Guggenheim Labs., Princeton, N.J.
NSG-3178
Rept. No. SAE-790356 ; 1979 ; 28p 39refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Sponsored by National Aeronautics and Space Administration.
Availability: SAE

HS-027 357

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE

Unsteady gas exchange processes in intake and exhaust systems of the internal combustion engine are described. The study of flow dynamics and gas exchange processes leads to better design of exhaust and inlet manifolds, matching and design of pulse-driven turbochargers, and information on catalytic converters and volumetric efficiency improvements. A finite difference scheme is used to solve equations that define intake and exhaust systems. Transient properties, such as pressure, temperature, and velocity, are computed and compared with results obtained using pressure measuring devices and an ultrasonic instrument to record gas temperature and velocity simultaneously. Boundary conditions are fixed by making small approximations with minimal loss in accuracy, resulting in simplified computer programs. Supporting equations are appended.

by P. A. Lakshminarayanan; P. A. Janakiraman; M. K. Gajendra Babu; B. S. Murthy
University of Technology, Loughborough, England; Indian Inst. of Tech., Madras; Indian Inst. of Tech., Delhi; Univ. of Santa Clara, Calif.
Rept. No. SAE-790359 ; 1979 ; 16p 14refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 358

HYDRAGAS SUSPENSION

Principles of the Hydragas fluid interconnection suspension system are detailed. The essential feature of the system is that car weight is carried by a water-based fluid with no pumps required. The Hydragas unit has a tapered piston which acts through a ball joint. Its arm is pivoted on dual concentric bonded rubber bushes, and a piston supports the diaphragm's inner ring. Diaphragm flexing between piston and skirt forms a fluid seal at the base of the unit. Five benefits of the Hydragas fluid interconnection system are: bigger car ride with the low-pitch frequency, resulting from the interconnection between front and rear wheel stations; constant ride frequencies and damping coefficients regardless of load; car life damping by eliminating conventional shock absorbers; convenience of packaging to maximize trunk space; and elimination of the anti-roll bars. The Hydragas system offers a unique solution to the problems of engineering the suspension for resized (downsized) cars to achieve acceptable ride standards and minimum weight, cost, and packaging, difficulties stemming from the high ratio of load-to-curb weight and the reduced ratio of pitch inertia-to-wheel base. Equations for the mathematical model of the Hydragas system are appended.

by A E. Moulton; A Best
Moulton Developments Ltd., England
Rept. No. SAE-790374 ; 1979 ; 26p 7refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 359

DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO

The rear suspension design and the vehicle development methodology for the 1979 Cadillac Eldorado are examined. Basic design guidelines were formulated in 1974. These were minimal vertical load couples into the control arm; low static bushing loads; minimal effect on ride of the stabilizer bar and linkage system; and low structural deflection. The level control system is a feature of the vehicle's rear suspension. Its principal components are an air compressor, electronic height sensor, and superlift shock absorbers. A study has been conducted to determine jacking and hoisting compatibility with the independent rear suspension. Provisions have been incorporated to facilitate toe setting at final car assembly and toe adjustment in field service. Static and cycle tests in the laboratory have been conducted to validate design features. Vehicle development is considered in relation to chassis performance characteristics, directional response references, chassis parameter references, subjective factors, specific development activities (spring rate, control arm bushings, stabilizer bar, frame, shock absorbers, and tires), and service factors.

by J. T. Hoban; C. J. Cislo; R. H. Triemstra
General Motors Corp., Cadillac Motor Car Div.
Rept. No. SAE-790375 ; 1979 ; 16p 3refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979
Availability: SAE

HS-027 371

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000

A reasonable commercialization scenario for alcohol fuels production was studied to determine whether it would match projections of electric utility peaking gas turbine fuel demand from 1973 to the year 2000. Estimates of fuel energy requirements were developed and compared to potential alcohol fuels availability. Evaluation was limited to simple-cycle combustion turbines and aircraft-derivative engines. Difficulties in predicting future electric utility peaking gas turbine capacity/fuel requirements were identified as: economic growth (i. e. industrial power demand); population growth (i. e. residential power demand); uncertainty about planning base load power plants (nuclear power plants); future role of electric power use; and utility capital resources (availability of capital for financing large base load plants). With limited information available on the future of alcohol fuels industry development, consideration was given to methanol from coal, methanol from wood (forest products), and ethanol from agricultural crops and residues. It appears that alcohol fuels can provide a significant percentage (45-55%) of energy requirements for electric utility gas turbines as early as 1985 if pursued on a high-priority basis and 100% of projected gas turbine energy requirements could be satisfied by 1987. Economics of alcohol fuels production, especially of optimizing the alcohol fuels production mix, will affect the financial viability of using these fuels for utility peaking turbines. The seasonal production of alcohol fuels and its match with the relatively seasonal use of peaking gas turbines must be considered, as well as the problem of converting fuel delivery and storage systems to handle alcohol fuels. Electricity production costs of alcohol versus conventional fuels in electric utility peaking gas turbines are appended.

by Richard L. Rentz; Thomas J. Timbario
Mueller Associates, Inc., Baltimore, Md. 21227
DOE-EX-76-C-01-2098
Rept. No. HCP/M2098-01; UC-96,97b ; 1979 ; 44p 17refs
Alternative Fuels Utiliization Program.
Availability: NTIS

HS-027 372

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)

The project planning document for the Dept. of Energy (DOE) Alternative Fuels Utilization Program (AFUP) provides specific criteria and guidelines for evaluating and developing nonpetroleum-based highway vehicle fuels derived from domestic resources. Five distinct alternative fuel categories have related program objectives and well-defined strategies to achieve objectives: new hydrocarbon, alcohol, synthetic gasoline and diesel, and emergency fuels. Problems common to all fuel types are resource availability, conversion technology status, and fuel-engine compatibility. Activity areas critical to alternative fuels development concern process technology assessment, fuel properties and composition, engine-vehicle characterization, and systems studies. Each fuel category is illustrated in a matrix format, and research and development areas to be addressed are noted. A conceptual approach to the ultimate AFUP objective of identifying and implementing an efficient domestic transportation system is described in relation to defined major classes of alternative fuels. Additional information on AFUP projects is appended (current status of projects, budget considerations, and current projects).

Department of Energy, Office of Transportation Programs, Washington, D.C. 20545
Rept. No. DOE/CS-0093; UC-96 ; 1979 ; 67p
Alternative Fuels Utilization Program.
Availability: NTIS; GPO, stock no. 061-000-00320-7

HS-027 373

FUEL ECONOMY MODELS (FUEL AND FUEL6)

The Automotive Fleet Fuel Consumption Model (FUEL) and the Fuel Economy Projection Program (FUEL6) are discussed, and model documentation is provided. The models are intended to help technical and nontechnical representatives of the National Hwy. Traffic Safety Administration in evaluating, using, and maintaining analytical techniques in fuel economy activities. The FUEL model's basic function is to assess potential fuel conservation benefits resulting from the implementation of hypothetical automotive fuel economy schedules. Input data include historical vehicle registrations and fuel economies (mpg), projected new model year registrations and fuel economies, vehicle survivability and miles traveled by vehicle age, and cash discouting parameters. Output data involve scenario comparisons for projected fleet-fuel economies, fuel consumption savings, fleet size and age, vehicle miles traveled, scrappage, and discounted cash savings. The FUEL6 model's basic function is to calculate the sales-weighted fuel economy for future model year passenger and nonpassenger automobile fleets. Input data concern Environmental Protection Agency fuel economy data by model year and manufacturer, projected percentage improvements due to technology, and penalties associated with regulatory constraints. Output data include data base modifications, engine displacement averages, horsepower-to-inertia weight ratio, fuel economy, and sales fraction as a function of inertia weight and body style. Model documentation includes general information, an engineers' guide, a users' guide, a programmers' guide, and a data element dictionary.

Automated Sciences Group, Inc., 8555 16th St., Suite 713,
Silver Spring, Md. 20910
1977 ; 100p
Prepared for the National Hwy. Traffic Safety Administration
Availability: Corporate author

HS-027 374

FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND

Major factors affecting automobile fuel demand trends were analyzed, using a previously-developed light-duty vehicle fleet fuel consumption model. The following factors affecting fuel demand were considered: auto sales; vehicle miles traveled (VMT); scrappage; fuel economy standards; and variance between Environmental Protection Agency (EPA) and on-the-road fuel economy figures. Other factors affecting fuel demand were fuel type, diesel market penetration, and medium/heavy-duty truck fuel consumption. A base case or "best guess" estimate of future fuel demand was developed, and factors influencing fuel demand were varied independently within the range of published estimates for those factors. High and low boundary cases were used to fix the range of possible fuel demand estimates, while conservation and consumption cases were employed to provide realistic alternative estimates of future fuel demand given certain changes in existing vehicle use patterns and fuel economy standards. Uncertainty regarding miles traveled per car and the gap between EPA and on-the-road fuel economy were the most important factors in fuel demand. Automobile scrappage rates also had a significant effect. Variations in light-duty truck registrations had a greater effect on fuel demand than passenger car registrations, due primarily to lower fuel economy levels of light trucks. Under base case assumptions, light-duty vehicle fuel demand is estimated to peak around 1980 at over 104 billion gallons per year and drop about 8% by 1990 before leveling off at about 96 billion gallons per year. Fuel demand in the boundary case ranges from 23% to about 50% below the base case in 1990. More realistic consumption and conservation cases vary from plus 8% to minus 13%, respectively, relative to the base case. This range demonstrates that the potential for reduced fuel demand is higher than the potential for increased demand. With increased conservation efforts, including a 3% reduction in travel, light-duty vehicle fuel demand can be reduced by 0.9 million barrels per day in 1990 below base case estimates. Relaxation of existing fuel economy standards, as shown in the consumption case with no change in travel, can cause an increase of 0.5 million barrels per day in 1990. Narrative and tabular data on automotive fuel demand are appended.

by Barry McNutt; Robert Dulla; David Lax
Department of Energy; Energy and Environmental Analysis, Inc.
Rept. No. SAE-790226 ; 1979 ; 29p 18refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979. Includes "Effect of Cold Weather on Motor Vehicle Emissions and Fuel Consumption", SAE-790229.
Availability: SAE

HS-027 375

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT

Environmental impacts of the electric and hybrid vehicle (EHV) project established within the Dept. of Energy (DOE) are assessed. The Electric and Hybrid Vehicle Research, Development, and Demonstratioin Act of 1976 (P.L. 94-413) requires a demonstration of 10,000 vehicles over the period from fiscal years 1978-1986, an associated program of financial incentives until fiscal year 1983, and an extensive research and development program. The most detailed portion of the environmental assessment covers first buys of the demonstration project (the number of vehicles demonstrated per year), performance standards, and financial incentives. Later buys and research and development activities are based on available information and reasonable projections. The state of knowledge regarding potential environmental effects of EHV's is rapidly improving as research and development and assessment results become available. Forecasting transportation system impacts is a well-developed discipline. As more information on EHV environmental impacts becomes available, it will be factored into the decisionmaking process. The environmental impact of the EHV demonstration is likely to be insignificant due to its relatively small scale, dispersed operation, and high degree of control. Potential safety and health effects are the most significant, followed by socioeconomic effects. Effects on other environmental systems are negligible. The principal socioeconomic impact concerns the need to train local firefighters near demonstration sites to prevent incorrect procedures in handling electric vehicle accidents. Further data and assessment are needed to evaluate long-term effects of the EHV program on the human environment. Long-range study should focus on materials utilization, physical effects on the environment, occupational safety and health, public safety and health, balance of payments, and cost implications. Further data are also required to resolve the question of hydrogen, arsene, and stibine gas generation during electric vehicle charging cycles. Additional information on EHV research and performance standards is appended.

Department of Energy, Assistant Secretary for Conservation and Solar Applications, Washington, D.C. 20545
Rept. No. DOE/EA-0075; UC-13,96 ; 1979 ; 91p 39refs
Availability: NTIS

HS-027 376

TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS

Topics relevant to hydraulic system analysis were covered at the 1979 SAE off-highway vehicle meeting. The session on "contamination in hydraulic systems" was attended by representatives of educational institutions trade societies, vehicle manufacturers, component suppliers, and related industries. Eight presentations focused on overall efficiency in the first few hours of a pump's life; hydraulic component cleanliness testing (methods and results); agriculture equipment manufacturer's approach to assure a clean hydraulic system; SAE recommended practice J1227 for assessing the cleanliness of hydraulic fluid power components and systems; particle counter physics; significance and preparation of classified test contaminants; multiple location radioactive wear analysis techniques; and ferrographic analysis for hydraulic fluids.

by Ken Riesberg, ed.; Bill Rolland, ed.
Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, Pa. 15096
Rept. No. SAE-SP-447 ; 1979 ; 67p refs
Includes HS-027 377--HS-027 384.
Availability: SAE

HS-027 377

INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE

Eighteen external spur gear pumps supplied by three manufacturers were tested to evaluate changes in overall efficiency during the first few hours of a pump's life and to assess performance characteristics. Pumps were subjected to a common break-in procedure except for variation in oil contamination level. Twelve pumps had clean oil (less than 100 particles/ml contamination), and the remaining pumps contained dirty oil (1500 particles/ml contamination). Results indicated a strong correlation between test stand contamination and roll-off cleanliness. No measurable benefit or liability was associated with contaminated break-in, although the effect of such break-in on life expectancy has yet to be evaluated. Changes in overall efficiency during the first few hours were primarily caused by changes in mechanical rather than volumetric efficiency. It is recommended that any industry standard to collect power conversion data for use in the marketplace require that a pump be broken in and then run at high pressure for about three hours.

by Thomas S. Wanke
Milwaukee (Wis.) School of Engineering, Fluid Power Inst.
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p1-10
Rept. No. SAE-790866 ; 1979 ; 29refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Sponsored by U.S. Army.
Availability: In HS-027 376

HS-027 378

HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS

Tests were run on hydraulic components of several four-cubic-yard tractor shovels to determine if critical components such as hoses, tubes, cylinders, and reservoirs were damaged during the cleaning process. Liquid automatic particle counting was used to determine component cleanliness in aircraft hydraulic oil and trichloroethane solvent. Test results were put into a computer data base for analysis. The overall contamination level in the hydraulic system was not found high enough to cause excessive damage to critical components. The test methods are relatively simple, reliable, and inexpensive. Computer analysis is an effective tool for studying large amounts of data and identifying pertinent factors. The test program has led to the development of specifications for contamination limits.

by W. A. Williamson
Clark Equipment Co., Corporate Devel. Center
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p11-6
Rept. No. SAE-790867 ; 1979
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 379

AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM

The approach taken by International Harvester to minimize customer downtime and assure a clean hydraulic system required the involvement of design engineering, manufacturing, and relability personnel. A special task force was established to reduce tractor warranty costs associated with hydraulic system failure due to contamination. The problems were found to be based on hydraulic failure from system blockage by visible particles and erosion failure from nonvisible particles. Causes of hydraulic contamination included metal shavings, grey iron, sand, shot, fiber, paint-sealer, sealing compound, miscellaneous dirt (floor), weld splatter, and rust. Six steps were implemented to minimize these causes: to clean rough casting prior to shipment; to flush each casting containing cast-in-tubes with pulsating high-velocity water; to receive hydraulic components at assembly plant in plastic bags, with major audit by inspection in producing plant prior to shipment; to run incoming hydraulic fluid supplied to test stands and fill points through a central filtration unit prior to use; to flush complete hydraulic system of each tractor with clean oil for five minutes, following a 10-minute run cycle; and run each unit for 30 minutes with add-on kidney filters after it has come off the assembly line. Benefits of contamination reduction include lower warranty costs and fewer customer complaints. Methods and procedures to assure compliance with cleanliness specifications are outlined.

by Ray Edlund
International Harvester
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p17-24
Rept. No. SAE-790868 ; 1979
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 380

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"

The work of the Task Group (roster attached) in developing the SAE Recommended Practice J1227 to assure clean hydraulic components and systems is reviewed. The practice is intended to provide a basis for measuring and reporting cleanliness levels so that built-in contamination and premature failure of hydraulic systems can be minimized. Items to be evaluated are complete systems and integral subsystems, static components (reservoirs, fittings, tubing, filter housings, and manifolds), dynamic components (pumps, motors, cylinders, accumulators, hoses, and valves), parts, and fill hydraulic fluid. Reynolds number is an important consideration. In illustrating the problem of room temperature flushing, it is shown that effective flushing should be done at a turbulent Reynolds number which exceeds the maximum Reynolds number experienced by a system under field conditions. Responses to a ballot reflecting approval/disapproval of the practice are noted.

by John A. Farris
Pall Industrial Hydraulics Corp.
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p25-30
Rept. No. SAE-790869 ; 1979 ; 4refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 381

PARTICLE COUNTER PHYSICS

Physical concepts in the operation of liquid automatic particle counters are addressed. Introduction of automatic liquid particle counter systems has promoted awareness of fluid particulate contamination. Basic measurement principles are similar in systems utilizing light blockage and/or light scattering. A light source is passed through a sensing volume and is incident upon a photodetector. When the sensing volume is devoid of any material (fluid and particulates), output from the photodetector is proportional to the light source intensity. The sensor operates in a two-dimensional reference frame. For a given sensor geometry, flow rate is directly proportional to the photodetector's frequency response. Five conditions should exist for acceptable particulate sizing and counting: the illuminating source should have a narrowband emission spectrum with a peak wavelength below the smallest dimension of the particle to be counted; the photodetector's response curve should peak at or near the same wavelength as the light source and should have a narrow response band; calibration for both size and rate should only be conducted with particles of known geometry which display a uniform area during transit; calibration should not be attempted with contaminant distribution so that deficiencies in the counting system can be isolated; and governing equations based on sensor geometry and response characteristics should not be violated. A critique of the American National Standards Institute Standard B93.28 for the calibration of liquid automatic particle counters is presented.

by Peter Mardosa
Dayton T. Brown, Inc.
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p31-7
Rept. No. SAE-790870 ; 1979 ; 5refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 382

THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS

Problems associated with the specification and size characterization of classified test contaminants (CTC's) in the hydraulic industry are examined. Contaminant amount is important in hydraulic system operation, but particle size distribution is even more critical in establishing the tolerance of a hydraulic component to contamination or in determining the degree of filtrating protection required. The location of reservoir breathers, cylinder seals, and filters can affect the amount of contamination encountered by an adjacently positioned component. Particle size distribution can be expressed in a spectrum of curves and mathematical functions which depend on the nature of particle composition and the reference system selected for display, i.e. algebraic, power, or integral functions. Other significant physical properties in CTC formulation include uniformity in specific gravity and particle shape throughout the CTC particle size distribution, chemical properties of classified test contaminants, and relative refractive index of particle solids to the testing fluid. The preparation of CTC's is discussed and the importance of specifications for CTC's in the hydraulic industry is emphasized.

by James N. Gehrking; Robert M. Nicholson; Robin E. Schaller
Donaldson Co., Inc.
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems, "Warrendale, Pa., 1979 p39-46
Rept. No. SAE-790871 ; 1979 ; 4refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 383

MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES

A proven radioactive technique is proposed for measuring wear in hydraulic components. The SPI-Wear system, developed by the SPIRE Corporation in Bedford, Mass., uses radioactive tracers only in the area of a wearing surface. Because of the system's selective nature, several areas within a component can be monitored simultaneously. The use of small irradiated areas of wearing surfaces permits the measurement of surface wear from outside the component. Several applications, including aerospace and engine wear evaluations, have successfully employed the system. It is suggested that the technique is appropriate for laboratory wear monitoring, hydraulic system component testing, performance degradation assessment, monitoring of several points within one component, measurement of activated surfaces from which material is being removed, and manufacturing processes. Proposed applications are metallic wearing areas of hydraulic system components, e.g. pumps, motors, valves, and cylinders. The technique can provide a direct relationship between surface wear and component performance degradation.

by Gordon W. Jones
Fram Corp., Providence, R.I.
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p47-54
Rept. No. SAE-790872 ; 1979 ; 5refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 384

FERROGRAPHIC ANALYSIS FOR HYDRAULIC FLUIDS

Principles and development aspects of ferrography are explained. Ferrography is a method of particle analysis for fluids, especially wear particle analysis for oil-wetted machine components. Instruments to conduct ferrographic analysis are the direct reading ferrograph which provides information on the concentration and size distribution of fluidborne wear particles, and the analytical ferrograph which is used to prepare a ferrogram which is subsequently examined with a bichromatic microscope. A special microscope is used to examine ferrograms equipped with both reflected and transmitted light sources. Ferrous particles are deposited on a ferrogram according to size because the force acting on a particle is proportional to volume while viscous resistance of the suspending fluid is proportional to surface area. Ferrogram examination in the bichromatic microscope reveals particle size, shape, and quantity details from which the condition of oil-lubricated parts can be assessed. Determining the composition of particles on the ferrogram can establish their origin. Deposition site, reflectivity, and particle color aid in identification. A simple mathematical model is presented to demonstrate how equilibrium particle concentration in machine oil is reached. The application of ferrography to study wear metals and other nonmetallic debris in hydraulic systems is examined. On-line monitoring of machinery rather than periodic sampling is recommended. An on-line ferrograph is currently under development.

by Daniel P. Anderson
Foxboro Analytical, Burlington, Mass.
Publ: HS-027 376 (SP-447), "Topics on Contamination in Hydraulic Systems," Warrendale, Pa., 1979 p55-60
Rept. No. SAE-790873 ; 1979 ; 10refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 376

HS-027 385

WHAT'S YOUR EXCUSE?

Information on the lifesaving potential of lap-type safety belts in accidents is reported. Half of all injury-producing accidents occur at impact speeds of 40 mph or less. Adequate safety belts are on the market, and official design standards include ease of adjustment. The chance of survival in an accident is five times greater if the person stays inside the car. Safety belts prevent ejection, yet thousands of deaths and serious injuries are caused by being thrown from the car, dragged or run over by another vehicle. Safety belts can also help prevent the "second collision," being thrown around inside the vehicle. They can keep an individual from being knocked unconscious. A rollover in a convertible is dangerous with or without safety belts, but only 10% of all serious accidents involve a rollover. Three-fourths of all traffic accidents occur within 25 miles of home, and about one person in four is involved in an accident every year. It is estimated that the use of lap-type safety belts would save at least 12,000 lives annually by preventing ejection from the vehicle and reducing contact with the vehicle interior and other occupants. Reasons for not using seat belts are cited.

National Safety Council
Publ: Fathom v11 n2 p16-7 (Fall 1979)
1979
Availability: See publication

HS-027 386

FORKLIFTS: TINY TRUCKS, BIG HAZARDS

The safe operation of forklifts is considered, with reference to equipment maintenance and operator precautions. According to a naval instructor of material handling equipment courses, a good starting point for forklift safety precautions is noting warning and data plates often located on the mast and sides of the forklift. Operators should understand and be familiar with these plates, and they should know the basics of forklift maintenance. Going too fast and misusing brakes are common accident causes. Before using a forklift, it is important to look for any hazards that may interfere with work. Rubbish, stacks of supplies, and scattered equipment are often in the way. Broken pallets or pallets without banding straps can produce a damaging spill. Pallets should always be lifted, never pushed or bumped into place. Forklifts should always be equipped with a "headache rack" or overhead guard. Other safety suggestions include testing the brakes, securing the forklift before dismounting, permitting no one but the driver to ride on the machine, using a safety pallet, keeping the forks as low as possible and grounded when standing, and above all, being alert while operating the machine to people who might be in the path.

by Derek Nelson
Publ: Fathom v11 n2 p27-9 (Fall 1979)
1979
Availability: See publication

HS-027 387

CONSPICUITY OF MOTORCYCLES

Experiments were conducted to compare the relative benefits of three methods for increasing the detectability of a motorcycle in daylight: increasing brightness of the motorcycle's front using low-beam and high-beam headlights; increasing the motorcycle's frontal area by fitting a white wind fairing to the front; and increasing rider visibility by requiring the rider to wear a high-visibility fluorescent red jacket. The first experiment measured response time for identifying various conspicuity-increasing devices on the motorcycle. The second experiment ascertained the detectability of various signals relative to the basic motorcycle. High-beam headlights significantly increased daytime detectability when compared to low-beam headlight use. Increasing the motorcycle's frontal area and increasing luminance contrast with the riding jacket provided lower daytime detectability than low-beam headlight use against a "cluttered" background. The wind fairing was more detectable than low-beam headlights in a "clean" background environment. It is concluded that signal detection methods provide a sensitive measure of the difference in motorcycle detectability when various visibility-increasing devices are employed, and that all four devices tested improved the daytime detectability of the test motorcycle.

by Martin J. Williams; Errol R. Hoffmann
Publ: Human Factors v21 n5 p619-26 (Oct 1979)
1979 ; 12refs
Availability: See publication

HS-027 388

STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS

The effectiveness is evaluated of regulations jointly issued in 1975 by the Federal Hwy. Administration and the Urban Mass Transportation Administration that require urban areas to develop short-range transportation plans. The plans are to represent a coordinated planning process in which automobiles, public transit, taxis, pedestrians, and bicycles are treated as elements of an integrated transportation system. Urban areas are to consider a wide range of projects, such as preferential treatment for transit and other high-occupancy vehicles, progressive timing of traffic signals, and establishment of pricing mechanisms to reduce vehicle use in congested areas. The regulations have resulted in more attention by urban areas to short-range low-cost solutions for transportation problems but have not produced integrated transportation plans or the widespread adoption of projects different from those implemented prior to regulation. The regulations have not been as effective as they could have been for three main reasons: the Federal Hwy. Administration and the Urban Mass Transportation Administration have not enforced the regulations consistently; urban areas have not been able to institute planning processes that culminate in unified plans; and projects with the most potential for improving the efficiency of existing transportation systems have not been widely adopted. The conclusion is that the Secretary of Transportation needs to strengthen Federal administration of regulations.

by Elmer B. Staats
General Accounting Office, Office of the Comptroller General, Washington, D.C. 20548
Rept. No. CED-79-126 ; 1979 ; 71p refs
Availability: Corporate author

HS-027 389

REGULATING CHRYSLER OUT OF BUSINESS?

The impact of government regulations on the competitive position of the Chrysler Corp. is evaluated. Regulatory requirements that appear uniform and fair may substantially alter the competitive structure of an industry because the burden tends to fall disproportionately on smaller firms. Congress has responded to auto safety, environmental, and energy concerns by passing a law authorizing the Department of Transportation to regulate auto design and manufacture. In assuring compliance with legislative mandates, regulations act as a form of taxation. Expenditures are made by a company to comply in order to stay in business and not in response to demands of the marketplace. The predicament of Chrysler Corp. is an example of unintended effects caused by increasingly more stringent regulations. Regulations reduce opportunities for companies to specialize in providing unique combinations of features to consumers. Since both Chrysler and Ford are smaller than General Motors, they have aimed more at specialized submarkets rather than toward the market as a whole. While it is impossible to predict the long-term impact of regulations, it is clear that fewer motor vehicles will be produced and that automobile users will pay higher prices. The cost of complying with safety, emission, and fuel economy standards is analyzed in some detail.

by Kenneth W. Clarkson; Charles W. Kadlec; Arthur B. Laffer
Publ: Regulation p44-9 (Sep/Oct 1979)
1979
Based on "The Impact of Government Regulations on Competition in the U.S. Automobile Industry," by the above authors (Wainwright and Co., 1979)
Availability: See publication

HS-027 390

DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION

The transmission of road-generated vibration into a vehicle body is treated as a source-path-receiver problem. With the suspension system acting as the path, improved isolation can be achieved by having a single compliant bushing at the connecting point of the shock absorber to the body and no bushing at the other end. Better vibration isolation can be attained with smaller stiffness ratio values. An expression for the absolute displacement transmissibility of a vehicle body is derived, and an optimization procedure is applied to analyze values of nondimensional variables. This reduces the maximum motion transmitted to a vehicle body from the road surface over a broad frequency range. Design data show the influence of three variables on transmissibility: bushing stiffness; resonant frequency ratio; and damping coefficient.

by E. Esmailzadeh
Publ: Vehicle System Dynamics v7 n2 p83-96 (1978)
1978 ; 17refs
Availability: See publication

HS-027 391

VEHICLE RESPONSE TO STOCHASTIC ROADWAYS

A procedure is developed to facilitate dynamic response calculations for vehicles traversing irregular surfaces. The procedure allows direct computation of mean square values and correlations of system variables for both transient and steady-state conditions. It is based on a differential equation for a covariance matrix which is directly related to vehicle state equations. Multiple white noise inputs can be incorporated, as well as inputs at two wheels following the same track at a distance from one another. The procedure is suitable for computer implementation without the complex algebra involved in finding all necessary transfer functions and without the need to evaluate integrals in order to find mean square values using the conventional approach. A simple vehicle model is worked out, and the variation of pitch and heave motion is plotted as a function of vehicle speed.

by Dean C. Karnopp
Publ: Vehicle System Dynamics v7 n2 p97-109 (1978)
1978 ; 6refs
Availability: See publication

HS-027 392

A STANDARD FOR VEHICLE DETECTORS. TENTATIVE REVISED STANDARD

A standard formulated by the Institute of Transportation Engineers (ITE) for loop, magnetic, magnetometer, radar, and ultrasonic (sonic) vehicle detectors is outlined. General requirements for vehicle detectors focus on electrical power, documentation, and guarantees. Functional requirements are enumerated for the various vehicle detector types. The standard is to be submitted to the ITE Technical Council and Board of Direction on 10 Jun 1980.

Publ: ITE Journal v49 n6 p21-30 (Jun 1979)
1979
Prepared by ITE Technical Council Comm. 4L-S
Availability: See publication

HS-027 393

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS

Standards and recommended practices promulgated by the Society of Automotive Engineers to address motor vehicle braking systems and components are delineated. The handbook contains tabular, graphical, and narrative information concerning such components as hoses and tubing, seals, gaskets, cylinders, valves, brake fluid, blocks, linings, and shoes. Among the requirements specified are those for nomenclature, labeling, location codes, test procedures, maintenance, and performance of systems.

Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, Pa. 15096
Rept. No. SAE-HS-24 ; 1979 ; 161p refs
Reprinted from the 1979 SAE Handbook.
Availability: Corporate author

HS-027 394

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR

A television publicity program was initiated in Victoria, Australia, to reduce the incidence of injuries related to poor seat belt adjustment, in spite of mandatory seat belt usage. Three target behaviors were chosen for study (degree of tightness, location of buckle, and webbing twist). The program was planned to emphasize benefits of a well-adjusted seat belt. Experiments were conducted to explore the relation between television publicity and behavioral change. Using a criterion measure of change in belt adjustment during roadside surveys, experiments demonstrated that intense exposure to television publicity over a short period significantly decreased the incidence of loosely adjusted belts, buckles located on the abdomen, and twisted belt webbing. Exposure involved three to four screenings per night during peak time on commercial stations for 14 consecutive nights. Other combinations of intensity and duration did not yield consistently positive results. Features contributing to the success of the program included specific target behaviors directly related to injury causation, capable of unambiguous demonstration, and associated with a widespread parent behavior; a message source of high credibility and status, with fear as a motivating factor, and comprising a specific concrete demonstration of target behaviors; and a campaign of short, intense exposure. It was concluded that television publicity was a practical stopgap countermeasure to enhance the longer term solution of redesigning seat belts; that the validity and utility of a limited range of communication principles has been reinforced; and that research can be successfully undertaken to measure the real-world effects of a publicity program.

by I. R. Johnston; M. H. Cameron
Commonwealth Dept. of Transport, Office of Road Safety, Box 1839Q G.P.O., Melbourne, Vic., 3001 Australia; M.H. Cameron and Associates, 17 Myrtle Grove, Blackburn, Vic., 3130 Australia
Rept. No. OR-3 ; 1979 ; 58p 16refs
Availability: Corporate authors

HS-027 395

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE

The impact of fitting and wearing seat belts on vehicle occupant safety in Australia is addressed. Over 100,000 road users have been killed and 2.2 million persons have been injured since 1925 when road accident data for Australia were first published. Encouraging seat belt use is the focus of major road safety experiments. The Design Rule (DR) system encompasses safety standards for seat belts and anchorages for passenger cars and derivatives. Improvements have been made to seat belt design and wearability through the DR system which requires seat belts in all new vehicles except buses. Compulsory seat belt wearing legislation has been enacted in Victoria. It is estimated that about 4,200 more people would have been killed since the early part of 1971 without this legislation, but additional efforts are necessary. Occupant protection must be further improved through belt system changes and vehicle redesign. Consideration must be given to the effect of usage on belt performance, the effect of enforcement on belt wearing, the role of publicity programs, and improved protection for younger car occupants. Additional information on restraint systems, vehicle safety, and seat belt legislation is appended.

by P. W. Milne
Commonwealth Dept. of Transport, Office of Road Safety, G.P.O. Box 1839Q, Melbourne, Vic. 3001, Australia
Rept. No. OR-2 ; 1979 ; 37p 93refs
Availability: Corporate author

HS-027 396

TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S

Accessibility and mobility problems of the transport-disadvantaged are addressed, particularly those of elderly and handicapped persons, and transport policies in the United States, Great Britian, France, and other countries are reviewed. Problems in providing transport for the elderly concern their lifestyle and frailty. The rationale for providing a minimum level of acceptable mobility for the elderly is based on social welfare considerations. The rationale for the handicapped is generally set in both economic and social terms. Seven urban movement options may be open to elderly and handicapped people: walking; conventional public transport; specialized transport; taxis; school buses and postal delivery buses; personal transport; and private systems. There is a general focus on providing relatively high accessibility to the elderly and the handicapped in industrialized countries. The major controversy centers on whether to offer universal accessibility or to limit the cost of modifying and constructing installations and rolling stock and providing special systems for the nonambulatory. The cost of new accessible vehicles or of retrofitting installations and vehicles so they are accessible to the disabled will be high, resulting in higher fares and an accelerating decline in bus usage. These costs would be higher than those of providing special transport services. Certain groups, however, have objected to special services as vulnerable to cut-off in times of financial stringency.

by Norman Ashford; William G. Bell
Publ: Transportation Planning and Technology v5 n2 p71-8 (1979)
1979 ; 23refs
Availability: See publication

HS-027 397

OUR UNEXAMINED AUTOMOBILE CULTURE

The "automobile culture" is examined in relation to the transportation industry's profit motive and the Federal government's ability to regulate the industry in support of public interests. The auto regulatory process is administered by the National Hwy. Traffic Safety Administration (NHTSA), the Federal Hwy. Administration, and the Environmental Protection Agency. Vehicle fuel economy and safety characteristics are regulated by the NHTSA. Public participation in the auto regulatory process is minimal, although citizens pay about $420 billion (in 1978 dollars) per year for mobility. The automobile-truck-highway share of this figure is $352 billion or 83%. Another $100 billion represents societal costs of automotively induced air and water pollution, congestion, accidents, medical expenses, and government subsidies. Much of the transportation industry's influence is based on its mastery and distribution of information. Both auto-highway lobbies and manufacturers conduct extensive public relations and advertising campaigns while the imbalance between public participation and industry interest in the regulatory process is not conducive to meeting transportation needs. Biases in environmental impact statements are discussed, and the importance of seriously regulating the auto industry is stressed.

by Brian Ketcham; Stan Pinkwas
Publ: Business and Society Review n29 p55-62 (Spring 1979)
1979
Based on article prepared for "Government Technology and the Automobile," Ginsburg and Abernathy, eds., New York, 1979.
Availability: See publication

HS-027 398

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)

The engineering focus of the National Hwy. Traffic Safety Administration (NHTSA) is considered. Factors that can be changed to decrease traffic accidents and deaths include automobile drivers and passengers, vehicles, and the highway environment. Programs to reduce the level of human failure involve driver education, law enforcement assistance, and rehabilitation and treatment of problem drinkers who drive. Efforts to reduce dangers in unsafe vehicles involve Federal Motor Vehicle Safety Standards for individual automobile components. Programs to improve the highway environment center around reducing dangers of the roadside or upgrading the availability and quality of safety resources for motorists. The NHTSA is responsible for stimulating programs to improve these safety resources. The agency's emphasis on crash engineering has encouraged administrators to be independent from the auto industry. Technical viability is a vital condition for any successful safety standard, but political and economic viability in terms of consumer acceptance and protection from unwarranted costs seems equally important. The research emphasis may facilitate technical viability while frustrating political and economic viability. Engineers do not consider economic costs of proposed standards and the appropriate role of the Federal Government in regulating automobile consumers. Of the five NHTSA administrators none has had formal engineering education. The inevitable reaction of most NHTSA personnel to administrator involvement is that he will make a political rather than a professional decision. It is concluded that the NHTSA has not pursued a well-balanced approach to highway safety. Air bag standards promulgated by the agency are noted as a case in point.

by Charles Pruitt
Publ: Public Administration Review v39 n4 p363-71 (Jul/Aug 1979)
1979 ; refs
Research sponsored by Alfred P. Sloan Foundation.
Availability: See publication

HS-027 399

CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE

Do-it-yourself procedures for checking and repairing various types of automatic choke on automobiles are described and illustrated. An engine's air-fuel mixture must be rich for good cold starting and running, since fuel vapor tends to condense on cold intake passages, leaning out the combustible mixture that actually reaches cylinders. Choking a cold engine produces an air-fuel mixture rich enough to overpower the lean-out tendency. Besides the choke plate, an automatic choke incorporates a thermostatic coil, heating system, and choke-break and dechoke mechanisms. Coil tension significantly affects the air-fuel ratio during engine start-up and warm-up. A choke's heating system warms the thermocoil enough to open the butterfly fully when the engine does not need more choking. Another choke heating system uses exhaust-heated air for warm-up. A remote choke gets its heat directly from contact with the exhaust manifold or intake-manifold exhaust-crossover passage. Some chokes pass hot engine coolant around the choke coil for a fast warm-up, and a few systems use more than one heating method to assure good choking under all conditions. The choke-break mechanism gets the choke plate cracked open as soon as the engine is running to prevent over-choking while the heating system becomes fully actuated. Most choke-breaks are vacuum kicks, pulloffs, or pulldowns. A fourth choke mechanism is the dechoke, choke unloader, or wide-open kick. The carburetor's fast idle works in conjunction with an automatic choke. Owner and shop manuals are useful in choke repair. The difference between too-rich and too-lean engine operation must be recognized. Cold starting problems due to incorrect thermocoil tension adjustment and/or wrong link length on a remote unit must be resolved, as well as cold running problems that result from faulty vacuum kick action.

by Richard Day
Publ: Popular Science v215 n5 p122-4, 127 (Nov 1979)
1979
At head of title: Day on Car Care. Based on the author's, "How to Service and Repair Your Own Car."
Availability: See publication

HS-027 400

THE INACCURACIES OF POLICE RADAR: OVERDRIVE'S REPORT

Errors associated with police use of typical police electronic speed measuring devices are identified. The simple pressing of a wrong button on the dash unit can cause radar to see signals it cannot properly decipher, (i.e. incorrectly pressing the stationary mode unit in a moving police car can cause the unit to read the police car's speed rather than the chased car's speed). If the officer fails to change from moving to stationary mode, the unit can misread. If the officer leaves the operation control button in the calibrate position, the unit can erroneously record and lock in the calibrate reading instead of the true speed. The pressing of light test buttons can lock in erroneous speeds as high as 88 mph. Batching occurs when the signal is initially sent out and a speed is incorrectly locked in before the unit has stabilized itself. Panning is another electronic mistake that happens when the officer sweeps or pans the unit from one traffic lane to another in order to catch alleged speeders in other traffic lanes. One of the most common errors is the reading of stray or unwanted electronic signals. The pitch of a whistle, mobile telephones, neon lights, microwave ovens and fluorescent lights, even flying birds, can cause speed readings on radar. A common source of radar misreading is faulty target identification since at 1,000 feet, the radar beam is about 135 feet wide. This fault of radar is that the unit sees and locks onto the largest mass or signal of least resistance, e.g. a truck, which illustrates the unit's built-in discrimination bias in picking out a larger vehicle that may be going slower alongside a faster but smaller vehicle. It has been estimated that radar transmission exposure can cause cataracts of the eyes. Public health hazards of radar, the importance of police thoroughness and honesty, and the effect of unfair radar techniques on police-community relations lead to the conclusion that police radar should probably be banned altogether.

Publ: Overdrive v19 n5 p84-6 (May 1979)
1979
Availability: See publication

HS-027 401

THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT

Emission and fuel economy data were obtained when 10 dissimilar cars were run using the 1975 Federal Test Procedure (FTP) and Highway Fuel Economy Test Procedures. Two pre-1975 cars and two cars designed to meet future emission standards were included. Remaining cars were 1977 and 1978 models of varying designs. The data was collected to determine how well emission control equipment designed to be effective at normal FTP test temperatures would work at temperatures ranging from zero to 110 degrees F. The influence of air conditioners was also ascertained. Results showed hydrocarbon (HC) and carbon monoxide (CO) emissions were generally higher at low ambient temperatures than at the "normal" FTP temperature of 80 degrees F. The HC and CO emission increases observed at lower temperatures appeared to be a function of vehicle technology. Air conditioner use generally caused a significant increase in HC and CO emissions. Nitrogen oxide emissions were affected by ambient temperature but to a lesser extent than HC and CO emissions. As expected, fuel economy decreased with temperature and with air conditioner use.

by R. S. Spindt; F. Peter Hutchins
Gulf Science and Tech. Co.; Environmental Protection Agency
Rept. No. SAE-790228 ; 1979 ; 28p 3refs
Presented at the SAE Congress and Exposition, Detroit, 26 Feb-2 Mar 1979.
Availability: SAE

HS-027 402

ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING

A two-year Hwy. Safety Res. Inst. study of yaw instability examined the causes and assessed means of eliminating such instability in tractor-semitrailers during cornering. The study was designed to identify maneuver conditions that produce tractor-semitrailer yaw instability; to examine the propensity for unstable yaw in various tractor-semitrailer combinations in use; and to identify primary mechanisms by which design and operating variables combine in tractor-semitrailers to degrade yaw stability. Efforts were also made to modify typical tractor-semitrailers in ways that defeat destabilizing mechanisms and to demonstrate stable performance of modified vehicles in full-scale tests. Based on an analysis of accident records, five tractor types and two semitrailer types were selected for computer simulation study. Design and operating variables included frame stiffness, suspension stiffness, tire mix, fifth wheel placement, and variations in semitrailer loading. Yaw instability during cornering was found to result from fore-aft imbalance in tire side forces. This imbalance on curves was primarily caused by designed-in differences in the roll stiffness of front and rear tractor suspensions. Two experimental modifications of tractors were developed, installed, and tested (frame-stiffening device and a front suspension sway bar). The sway bar, designed to increase the roll stiffness of the front suspension, effectively eliminated yaw instability at levels of lateral acceleration less the rollover threshold. Combinations of design options and operating practices are listed which lower the yaw-instability threshold of a tractor-semitrailer, and suitability of various engineering methods for examining yaw instability are evaluated. Further research is recommended to evaluate the role of yaw divergence in accidents, the design and operating parameters known to influence yaw instability, and the extent to which directional control of tractor-semitrailers is affected by open-loop stability. The National Hwy. Traffic Safety Administration is requested to advise motor vehicle manufacturers about study findings on vehicle design and use.

by Robert D. Ervin; Robert L. Nisonger; Chalasani Mallikarjunarao
Publ: HSRI Research Review v10 n1 p1-17 (Jul-Aug 1979)
1979
Availability: See publication

HS-027 403

SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS

Seat belt emergency locking retractor (ELR) performance was measured in a sample of 44 automobile models (1976-1978) sold in Canada which were subjected to 30-mph frontal barrier crash tests. Vehicles ranged from subcompacts to full-size cars. Restraint system performance was correlated with such parameters as seat belt configuration, webbing elongation and compaction on ELR, ELR performance, shoulder belt peak load and loading profile, vehicle acceleration profile, vehicle interior compartment geometry, and injury criteria (including head injury). Although retractors locked at the onset of dummy movement in 30-mph tests, the driver dummy struck the steering wheel and column and the passenger dummy struck the dash. Impact forces were attenuated by restraint systems and did not appear to be life threatening, based on Canadian and U.S. motor vehicle safety and occupant crash protection standards. All ELR's performed satisfactorily, but considerable performance differences were observed with respect to actuation time and webbing extension. The number of interacting variables in each restraint system made a direct determination of the effect of a particular ELR on occupant crash protection very difficult. These test data can be used as an accident investigation tool to understand the mechanism of restrained occupant injuries and to explore the effectiveness of occupant protection safety standards.

by Murray Dance; Bert Enserink
Transport Canada, Road and Motor Vehicle Traffic Safety Branch; Dynamic Science, Inc., Phoenix, Ariz.; Calspan Corp., Buffalo, N.Y.
Rept. No. SAE-790680 ; 1979 ; 18p
Presented at the SAE Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979. Based in part on Calspan Report No. ZP-6014-V-17.
Availability: SAE

HS-027 404

IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER

Specifications and criteria to improve safety belts by eliminating comfort and convenience problems are discussed. Major comfort and convenience problems for automatic safety belts include fit of the shoulder belt across the occupant, shoulder belt pressure exerted against the occupant, latch plate accessibility in front and rear seats, buckles getting lost between seat cushions, webbing retraction, retractors that lock up when being put on or tighten across the occupant's lap while being worn, and retractor systems with excessive shoulder belt slack. Automatic safety belts will be standard equipment in many new cars, beginning with 1982 models. The specifications and criteria to guide auto manufacturers are intended to reduce the likelihood of consumer rejection and nonuse of both automatic and manual safety belt systems. It is important that designed aspects of restraint systems and daily system operation be reliable.

by Peter N. Ziegler; P. Robert Knaff
National Hwy. Traffic Safety Administration
Rept. No. SAE-790681 ; 1979 ; 15p 9refs
Presented at the SAE Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979.
Availability: SAE

HS-027 405

ASSESSMENT OF SEAT BELT USAGE--METHODS/ RESULTS/RECOMMENDATIONS

The effectiveness of seat belts in reducing car crash fatalities and injuries is considered, and increased use is recommended to achieve individual and societal benefits. Dimensions affecting seat belt use are comfort, convenience, effectiveness, and occupant perception of risk. Seat belt use surveys indicate that seat belt systems are inconvenient and uncomfortable to use but that they offer real protection to car occupants. Productive programs for increasing seat belt use can be established on the basis of public attitudes, the imminent installation of passive seat belts in front car seats, and the possible adoption of mandatory seat belt use laws. The impact of automatic seat belts and mandatory seat belt use laws is considered.

by H. George Johannessen; George F. Johannessen; Charles H. Pulley
Firestone Tire and Rubber Co., Hamill Mfg. Div.; Avis Rent-A-Car Systems, Inc.; American Seat Belt Council
Rept. No. SAE-790682 ; 1979 ; 11p 13refs
Presented at the SAE Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979.
Availability: SAE

HS-027 406

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES

Seventeen safety belt studies are reviewed to identify possible causes for the disparate assessment of safety belt benefits in accident injury reduction. Published studies report wide variations in the extent to which lap and shoulder belts or lap belts alone reduce injuries and deaths in automobile crashes. In most studies, occupant injury is classified according to one of several categories on a subjective rating scale for lack of an objective measure; other studies define injury according to arbitrary categories with different boundaries. Factors that contribute to the disparity include differences in injury scale values, inaccuracies in reporting occupant belt status, and variations in sampling criteria. Supporting data are appended.

by B. J. Campbell; Donald W. Reinfurt
University of North Carolina, Hwy. Safety Res. Center
Rept. No. SAE-790684 ; 1979 ; 15p 32refs
Presented at the SAE Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979.
Availability: SAE

HS-027 407

SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE

Safety belt use in the Detroit area was studied during 1977 in conjunction with an effort sponsored by domestic auto manufacturers to increase use through mass communication techniques, in this case, by a campaign involving the slogan, "Somebody Needs You." The study methodology incorporated a sophisticated sample design and strictly controlled procedures utilizing 224 observation sites. The possibility of generating sample selection biases when using a few sites that may exclude some driver groups was demonstrated. Biased estimates of change were also shown to be possible, even when using the same few sites in repeated studies. Differences between the Detroit study and a study conducted by the National Hwy. Traffic Safety Administration (NHTSA) are analyzed. Variations in results are attributed to sample selection biases in the NHTSA methodology. Procedures followed in both Detroit and NHTSA studies are described in appendixes.

by Michael G. Dworkin
Lincorp Res., Inc.
Rept. No. SAE-790685 ; 1979 ; 14p 8refs
Presented at the SAE Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979.
Availability: SAE

HS-027 408

A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE

A national survey of 1,500 adults and 500 adolescents identified major factors that explain driver seat belt use. Particular attention was paid to the role of interpersonal interaction and instruction in instigating and reinforcing seat belt use. The significance of interpersonal interaction (peer and authority pressure) was assessed in relation to the impact of demographic variables, perceptions of seat belt comfort and convenience, attitudes toward seat belt use, and establishment of the seat belt "habit." Interviews conducted in 1977 revealed seven factors in driver seat belt use: propensity to use seat belts; interaction in the vehicle between drivers and adult-teenage passengers; general affective attitudes about seat belts; fear of entrapment; perceptions of comfort and inconvenience; passenger-driver interactions; and significant events and conditions. Persons with inertia reel restraint systems in vehicles were most likely to have positive attitudes about seat belts and to feel comfortable wearing them. Seat belt use was proportional to the formal education level of drivers.

by Timothy J. Kuechenmeister; Andrew J. Morrison; Mitchell E. Cohen
General Motors Corp.; Market Opinion Res.
Rept. No. SAE-790687 ; 1979 ; 16p 26refs
Presented at the SAE Passenger Car Meeting, Dearborn, Mich., 11-15 Jun 1979.
Availability: SAE

HS-027 409

A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT

A user's manual for the design and construction of Class I bike path pavements is presented. The dramatic increase in the number of bicyclists has resulted in an equally significant increase in the number of bicycle accidents and fatalities. Safety, recreation, and transportation are reasons given for the construction of bicycle paths, although the costs of construction have often been prohibitive. The user's manual is intended to provide engineers and planners with guidelines for the selection of low cost bike path pavement structures under varied service conditions. Guidelines are given for material characterization and construction requirements associated with various pavement structures. Steps in the general design approach to bike path pavement construction include generating design inputs for traffic the pavement is to support, climate of the region, and subgrade soil properties; selecting pavement sections; conducting economic analysis of pavement sections; selecting an optimum pavement system; characterizing material properties; and establishing construction guidelines and specifications for the proposed pavement system. A flow chart illustrates these steps. Information is appended on pavement design, material testing methods, and soil stabilization in bike path construction.

by James S. Lai
Georgia Inst. of Tech., School of Civil Engineering, Atlanta, Ga. 30332
DOT-OS-50226
Rept. No. DOT/RSPA/DPB-50/77/18; PB-286 610 ; 1977 ; 92p
35refs
Availability: NTIS

HS-027 410

COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT

A unique way of providing transportation and related services to elderly and handicapped individuals in Mountain View, Calif., is reported. The Mountain View Community Broker Demonstration Project was designed to combine information and referral with a personalized transportation system. A community broker furnished clients individualized primary service information and scheduling assistance. The broker also drove clients to their destinations in a 12-passenger van. Most popular trips were for shopping, a nutrition program, and commercial meals. Ridership never reached expected levels and estimated operating costs of the project were high ($29,285 for 8,776 passenger trips, cost per trip of $3.34, and revenues of $3,432). The community broker concept and project operations are explained. Comments are offered on how a community broker project can be successfully integrated into the social service network for elderly and handicapped individuals. Excerpts from the community broker/driver log and the form used to survey project users and nonusers are appended.

by Tom Cooper
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DOT-TSC-1081
Rept. No. UMTA-CA-06-0002-78-1; DOT-TSC-UMTA-78-20;
PB-285 234 ; 1978 ; 135p
Rept. for Feb 1976-Feb 1977. Service and Methods Demonstration Program.
Availability: NTIS

HS-027 411

SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT

Six subsidized taxi systems serving elderly and handicapped people in the San Francisco Bay area were evaluated in order to
identify similarities and differences among programs and to a
certain program cost-effectiveness relative to taxi operators, su
sidizers, and users. Interviews were conducted with clients, an
cost and ridership data were collected. Subsidized taxi servic
appears to be economically viable as a mode of providing tran
portation for elderly and handicapped people. It is less costl
than most demand-responsive bus systems and requires little
no consumer education. Startup and transition problems tend
be minimal. Concerns that subsidized taxi programs will trigg
impossibly high demand levels appear to be unfounded, a
though phased service implementation is an important aspect
the planning process. Subsidized taxi programs have vario
financial arrangements among taxi operators, clients, and subs
dizers of service. Evidence shows that prepayment schemes a
undesirable. There is some indication that clients are reluctant
utilize the group riding option. None of the six programs h
total capability, i.e., none is able to serve elderly and hand
capped people who cannot use taxis. Program documentation
appended.

by Pamela Bloomfield; Sydwell Flynn
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DOT-TSC-1081
Rept. No. UMTA-MA-06-0049-77-9; DOT-TSC-UMTA-77-42;
PB-281 474 ; 1977 ; 86p
Rept. for Mar-Aug 1977.
Availability: NTIS

HS-027 412

THE PHYSICIAN'S RESPONSIBILITY FOR EPILEPTIC DRIVERS

State legislation requiring physicians to report names of epile
tic patients to the department of motor vehicles is considere
The accident rate of known epileptic drivers is about twice th
of the general population. Repeated surveys document that pe
sons with epilepsy fail to report their illness due to soci
psychological, and economic pressures. Although the accide
record for epileptic drivers is relatively high, the degree
individual responsibility is a more important determinant
driving performance. Mandatory reporting laws represent a se
ous infringement on rights of individuals to privacy in person
affairs, and data regarding the efficacy of mandatory reporti
laws are conflicting. The Commission for the Control of Epile
sy and Its Consequences suggests an alternative solution bas
on the premise that primary responsibility for reporting re
with afflicted individuals. The commission recommends th
physicians be required to notify all patients subject to lapses
consciousness of their obligation to report themselves to t
department of motor vehicles. The patient should be notified
writing, and notification should be recorded in the patien
record to relieve the physician of any responsibility if an ac
dent occurs.

by Richard L. Masland
Publ: Annals of Neurology v4 n6 p485-6 (Dec 1978)
1978 ; 8refs
Availability: See publication

HS-028 398

A SAFETY SEAT WITH INCORPORATED BELTS. STUDY

Development work is described for a prototype energy-absor
ing car seat with seat belts incorporated in the frame. Anthrop
metrical characteristics (relative to the Italian driver popu
tion), seat dimension, and static driver measurement studies a

discussed. Seat design objectives are outlined concerning driving comfort, maximum visibility for the driver, anatomical positioning of the driver's back, and impact protection. The selected seat belt arrangement is described (symmetrical, crossed system corresponding to belts used in stock race cars, acrobatic planes, and parachutes). A major safety feature of the seat is the use of two hydraulic shock absorbers, which protect the occupant from whiplash in frontal impacts. A series of separate studies on each component feature which was required for practical construction of the prototype includes studies on hydraulic system dimensions, sliding of the longitudinal adjustment of the seat back, ideal curves for back shape, and the metal framework of the system and support points for the safety belts. Photographs of the safety seat system are included. The prototype soon will be installed in a production car for driving tests, ending with a frontal impact test.

by Filippo Moscarini; Angelo Biagi
Istituto Sperimentale Auto e Motori S.p.A., Italy
Publ: HS-805 199,"International Technical Conference (7th) on Experimental Safety Vehicles", Washington, D.C., 1979 p203-9 1979
Conference held in Paris, 5-8 Jun 1979. Research sponsored by Italian Ministry of Transport, and conducted in cooperation with Higher Testing and Res. Center of Rome.
Availability: In HS-805 199

HS-028 399

SAFETY SYSTEMS OPTIMIZATION MODEL

The Safety Systems Optimization Model is an experimental computer program which is designed to make large-scale simulation studies (involving thousands of runs) more practicable. The approach is to substitute simple approximations for the otherwise prohibitively expensive performance of many multi-degree-of-freedom dynamics simulations. The model presently estimates overall performance of some concept for each of 852 conditions of accident exposure. The two classes of simulation involved are those of the vehicle structure, and the restrained occupant. The model can automatically step through incremental variations in certain vehicle and restraint parameters, going through the 852 conditions each time, within user constraints specified for the conceptual vehicle. The model is necessarily several steps removed from reality, but its value is its theoretical estimation of both struck and striking vehicles in many simulated crashes. An example of a model run is provided for a 3000 lb conventional car using arbitrarily chosen cost and materials substitution constraints. Two solutions were obtained, one for three-point belts assuming 70% usage, the other for air bags with 100% lap belt use and 70% three-point use in the "other" cars. Suggestions are provided for future improvement and expansion of the model.

by John Versace
Ford Motor Co., Safety Res.
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p210-7 1979 ; 4refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 400

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE

A method is described for evaluating and optimizing the "mutual" protection characteristics (compatibility) of vehicles in a frontal collision, with specific reference to the accident situation in a particular market. The method is based on an exact market and accident analysis covering the cumulative frequencies of vehicle masses, of front structure deflection characteristics, and of closing velocities in frontal collisions resulting in personal injury. Using this analysis and a collision model, frontal collisions can be simulated and evaluated for every possible "other" car. Results enable the degree of aggressiveness in a frontal collision to be evaluated of a specific car in a particular market area. The data obtained are used to determine the optimum design of the vehicle front structure and restraint system. The method is applied to the West German market using the dynamic crush in a 30 mph fixed barrier crash as the criterion for the deflection characteristic of the front structure.

by Reinhard Wagner
Audi NSU Autounion A.G., Federal Republic of Germany
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p217-24 1979 ; 7refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 401

DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS

Results are presented on the performance of the VWRA (Volkswagen Restraint Automatic) system in 0 degree frontal barrier (Federal Motor Vehicle Safety Standard (FMVSS) 208 requirements), 30 degrees frontal barrier, and lateral (FMVSS and Economic Commission for Europe requirements) crash tests. The VWRA system comprises a torso belt with dual sensitive automatic locking retractor, knee bolster, seat, and seat belt anchorage connected to the seat frame. Results are given in terms of head injury criterion, resultant chest acceleration, and femur force measurements. For frontal impact tests, results are also given for a VWRA system with lap belt added, and a three-point belt system. For the lateral impact tests, three different restraint concepts are compared: driver and rear seat passenger without restraint system; driver restrained with three-point belt, rear seat passenger with lap belt; and driver with VWRA, rear passenger with lap belt. Results are reported of U.S. investigations of accidents involving VWRA-equipped cars. Possible improvements to the VWRA system, such as preloader and belt force limiter, are described. The potential of restraint systems today, both active and passive, with respect to injury reduction, has been demonstrated with the VWRA system.

by Wolfgang Rosenau; Rudiger Weissner
Volkswagenwerk A.G., Res. and Devel., Federal Republic of Germany
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p224-31 1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 402

MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE

Procedures and results are described of various performance tests of air bag G-sensors mounted either on the radiator support or dash panel of a subcompact vehicle. The four test categories included Federal Motor Vehicle Safety Standard 208 barrier crashes, real-world crash types, barrier crashes for sensor actuation threshold performance, and exposure to various shocks expected during normal vehicle service. Test results are compared with results of computer simulations of sensor mass response to crash pulse. A prioritization of sensor performance test modes is presented, as well as four possible sensor schemes. It is concluded that forward- and dash-mounted sensors each have their disadvantages and advantages in terms of sensing time, crash discrimination capability, and agreement with simulation results. Their combined use is preferable. It is concluded that a sensor actuation threshold to meet a narrow speed range will be difficult to achieve because of variations in body crush characteristics. Vehicle front modifications are necessary in order to improve sensor/vehicle interface for various crash types.

by Osamu Ichinose; Koji Kurimoto; Hirosuke Nakaya
Toyo Kogyo Co., Ltd., Japan
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p232-46 1979 ; 4refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 403

IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT

Results are presented of tests carried out in support of the development of new impact test procedures for European legislation on improved car frontal crash protection. One series of tests involved full-scale crashes with seat-belted dummies to compare car-to-car frontal impacts with various car-to-barrier tests. The angled, wood-faced barrier test was determined to be the most suitable. A second part of the test program involved car-to-barrier impacts using 12 models of current production cars (European and Japanese makes): perpendicular at 54 to 59 kph; partial barrier, 30% offset, 49 to 50 kph; and 30 degree angled, wood-faced barrier, 58 to 60 kph. Based on results of this testing, it is suggested that the 30 degree wood barrier test at a speed range of 55 to 60 kph replace the 48 kph full frontal impact now used in European legislation. An interior test using a free-flight spherical headform is proposed, and results reported from 22 interior impact tests on each of the 12 models used in the barrier tests. Consideration is given to the problem of choosing the impact speed and the pass levels for dummy loads for a legislative test, as well as the variability in loads and accelerations measured on dummies in full-scale tests.

by Ian D. Neilson; Slade Penoyre; S. P. F. Petty
Transport and Road Res. Lab., England
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p247-63 1979 ; 8refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 404

RESULTS OF COMPARATIVE FRONTAL CRASH TESTS

Results are presented from two crash test programs designed to gather comparative data on occupant behavior and injury criteria, and concerning vehicle velocity change, deceleration characteristics, and deformations, for different crash modes. The first phase consisted of 71 tests, either car-to-barrier (centered, offset, or at an angle) or car-to-car crashes with various overlaps. Various dummy types were used. A great disparity in results was found, both between crash modes, and between different cars for the same crash mode. It was concluded that the 30 degree barrier test was most representative. The second phase consisted of 52 tests comparing only the 0 degree and 30 degree barrier tests, using the Part 572 dummy. The scatter in results using this dummy was found to be less than that obtained using first-generation dummies in the first test series. In comparison with the 0 degree barrier test, the 30 degree barrier test was found to give a slightly lower velocity change, a lower maximum deceleration, and a much greater deformation to the car; and, with respect to the dummy, a lower Head Injury Criterion with small data disparity, chest deceleration at the same level with a slightly lower severity index, and femur loads at the same level.

by Philippe Ventre
European Car Manufacturers, Crashworthiness Working Group (CCMC)
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p264-8 1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 405

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS

The National Hwy. Traffic Safety Administration (NHTSA) has promulgated a revised Federal Motor Vehicle Safety Standard (FMVSS) 208 (Occupant Crash Protection) which requires, by model year 1984, that all new passenger cars sold in the U.S. be equipped with automatic protection systems (air bags or passive seat belts). FMVSS 208 emphasizes frontal protection, since about 50% of automobile occupant fatalities occur in this crash mode. The standard requires protection up to a 30 mph rigid barrier impact, but accident analysis indicates that higher speed protection is necessary. Although FMVSS 208 offers some level of protection above 30 mph, improved vehicle structures and restraints are necessary for further fatality and injury reductions. In order to accomplish this improvement in frontal crash protection, as well as in other crash modes, NHTSA has developed the 400 Series rulemaking activity. Prime consideration will be given to specifying vehicle compatibility requirements (i.e. tradeoffs between vehicle aggressivity and crashworthiness covering a wide range of vehicle types and weights, and accident modes, as well as vehicle front-end aggressivity to pedestrians). The 400 Series will incorporate the development of advanced test dummies and injury criteria, as well as improved laboratory test procedures. The final product will be a family of vehicles which will demonstrate enhanced safety in all crash modes (frontal, side, rear, and rollover). The anticipated effective date of the 400 Series is Sep 1988.

by William A. Boehly; L. A. DeLarm; J. B. Morris
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p269-87 1979 ; 4refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 406

A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS

An ongoing research project of HUK Verband (Assoc. of German Automobile Insurers); Inst. of Automotive Engineering, Technical Univ. of Berlin (TUB); and Volkswagenwerk A.G.

(VW) is reported the goal of which is to determine means of improving passenger car compatibility. The project involved analysis of data on car-to-car crashes (involving casualties) in the Federal Republic of Germany in order to rank collision types according to their significance. Five selected collision types were studied in actual vehicle crash testing and by computer simulation. VW Rabbits and Audi 100's were studied, and Federal Motor Vehicle Safety Standard 208 injury criteria used. Dummy loadings obtained in experiments and by simulation were compared, and functions derived for relating dummy loading to accident criteria. Computer optimization of deformation structures has indicated possible vehicle and restraint system design changes for improved automobile compatibility and analyzed the effectiveness of the technological changes. Among other things remaining to be accomplished are cost-benefit analyses of proposed design changes.

by H. Schimkat
Volkswagenwerk A.G., Federal Republic of Germany
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p287-300
1979 ; 7refs
Conference held in Paris, 5-8 Jun 1979. Research sponsored by Bundesminister fur Forschung und Technologie (Germany).
Availability: In HS-805 199

HS-028 407

A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS

The deformation behavior of seat belt assembly anchorages under static and dynamic load conditions has been experimentally studied to determine the relationship between seat belt safety requirements (specifically, Federal Motor Vehicle Safety Standard (FMVSS), Seat Belt Assembly Anchorages) and the design of vehicle body structures. The experiments showed that although the standard load of FMVSS 210 (static test) is approximately equivalent to the input from a 50th percentile dummy in an actual 30 mph head-on collision, the anchorage deformation with FMVSS 210 load was significantly greater than that experienced in the 30 mph crash. Static load conditions were examined for the simulation of an actual 30 mph head-on collision. The load in a static test which causes the same amount of deformation as in an actual collision was determined to be from 52% to 86% of the load in the collision. The appropriateness of the static seat belt anchorage strength of FMVSS 210 and other standards is therefore questioned. As a more realistic approach, a selection system is proposed in which the seat belt anchorage strength will be acceptable if it passes any one of the following tests: static test with revised load, FMVSS 208 conditions, or bench collision simulation test. It is felt that this approach will permit the construction of lighter weight vehicles (for improved fuel economy), and the design of seat belts which are easier to use.

by Satoshi Morita; Shigeo Fukuda; Toru Iwata
Nissan Motor Co., Ltd., Japan
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p300-8
1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 408

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)

A series of dynamic tests to initially study the effectiveness of an inflatable diagonal belt relative to other restraint systems such as the three-point belt was carried out with a live subject (a baboon). The inflatable diagonal belt in the pre-inflated state gave more protection to the animal than a three-point system at an impact speed of 48 kph, and no injuries were observed in the animals restrained by the preinflated diagonal belt at 60 kph (three-point belt not tested at this speed). From the findings of the animal experiments, an inflatable diagonal belt system was designed. Adjustment tests were made on the gas generators, and the belt fabric was selected for compatibility with the gases. Testing of the restraint system carried out at 50 kph with the Hybrid II dummy showed that this dummy was not suitable for the assessment of the inflatable diagonal belt. The advantages of this system at the present stage of study have been mainly demonstrated in the tests with the live subjects. Relative to other inflatable restraint systems, it offers two great advantages: ensures protection even if it fails to inflate; and in the case of inadvertent firing, produces no loss in visibility for the driver, no excess pressure effect in the passenger compartment, and a very low sound level.

by Pierre Billault; C. Tisseron; Maryvonne Dejeammes; Roger Biard; P. Cord; Pierre Jenoc
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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p308-21
1979 ; 6refs
Conference held in Paris, 5-8 Jun 1979. Research sponsored by Institut de Recherches des Transports (France).
Availability: In HS-805 199

HS-028 409

OCCUPANT PROTECTION IN FRONTAL IMPACTS

The design of passenger cars for occupant protection in frontal crashes is outlined. After determining representative vehicle speeds for engineering analysis, the statistical distribution of injuries among car passenger for the different parts of the body is examined, using injury criteria (Federal Motor Vehicle Safety Standard 208). In the present case, the chest injury criterion is considered sufficient for development purposes. The longitudinal component of the resultant chest acceleration is chosen for study because it corresponds with the restraint system and is compatible with vehicle acceleration. Based on sufficient test evidence, the car's longitudinal acceleration is selected as the vehicle design parameter. Starting with the test results of an experimental car, the first indication of the front-end collapse behavior is provided by the acceleration characteristic of the vehicle. The energy-absorbing capabilities of the individual front-end components are analyzed in crush testing. All individual component results are used as input into a computerized simulation model. The first simulation establishes compatibility with real crash test results. Extensive analysis follows for ordering of priority areas. Order-sensible modifications are computed and checked vs. total system effect. This process enables an iterative design optimization with regard to vehicle acceleration. Optimization results are converted into the design and verified by further crush testing before a confirmatory vehicle barrier test is performed. A flow of the developmental process is appended.

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HS-028 410

DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION

The functions and characteristics of two different types of steering column assemblies appropriate for application in the driver air cushion restraint system (ACRS) and the passive belt system are described. The air cushion and passive belt columns are critical components which determine the effectiveness of each system. The functions and characteristics of each type of column are unique. An air cushion column performs two vital functions: it orients restraint loads and absorbs driver kinetic energy. To do this, the ACRS column axis should be oriented as closely as is practical to the torso center of gravity of the 50th percentile male driver. The height and angle of this column should be selected to achieve either a pitching or a controlled submarine trajectory. The characteristics of the energy-absorbing unit of the ACRS column are a function of the column orientation, design crash severity, and the vehicle deceleration waveform. An ACRS column should be stable relative to its energy-absorbing function so that the collapse force of the column is sufficiently insensitive to nonaxial loads. The passive belt column performs a dual role: it must be a positive protective device when the belt is circumvented, and it must be a noninterfering element of the vehicle interior when the belt is worn. Assessing the net benefit of conventional energy-absorbing columns on the basis of field data is beyond the present level of data sophistication. A satisfactory approach in designing a passive belt column is to design the column to function in a dual mode: to perform as a function of the driver's trajectory which, in turn, can be made sensitive to whether or not the belt is circumvented. Such a column configuration is comprised of a well-padded wheel which has a yielding rim, a self-aligning element, an axial collapse unit, and yielding support bracketry.

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Minicars, Inc., Santa Barbara, Calif.
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1979 ; 2refs
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HS-028 411

JOINT BIOMECHANICAL RESEARCH PROJECT (KOOPERATIONSVERBUND BIOMECHANIK). PRELIMINARY REPORT

Some initial results are reported from the Joint Biomechanical Res. Proj., Kooperationsverbund Biomechanik (KOB), a large-scale program of reconstructing real accidents (each accident case involving five to six reconstructions using dummies and three using human cadavers). Some reconstructions of head-on, lateral, and pedestrian collisions are reported to illustrate the methodology used, to show its feasibility, and to indicate the results which can be expected. The areas of scatter for the preliminary results are discussed. The general goals of the research project are to obtain information on the human body'
tolerance limits under realistic impact conditions, and to deter
mine a significant correlation between real injuries and dumm
test results, as well as between human tolerance levels an
injury protection criteria. When the program is complete, it
hoped that sufficient information will be available to establis
appropriate performance standards for Europe.

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Biomecanique, France; Volkswagenwerk A.G., Federal
Republic of Germany
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Experimental Safety Vehicles," Washington, D.C., 1979 p344-5
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Engineering (FAT), European Car Manufacturers Crashworthiness Working Group, (CCMC), and European Economic
Community.
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HS-028 412

SYNTHESIS OF HUMAN TOLERANCES OBTAINEI FROM LATERAL IMPACT SIMULATIONS

Results are summarized from biomechanical experiments usin
fresh, unembalmed cadavers to study human tolerances to sid
impacts. The findings are the most recent from free-fall tes
performed over the past few years. In studies of head impac
no relationship was found between Head Injury Criterion (HIC
and Abbreviated Injury Scale values. For these lateral sku
impacts, only a slight likelihood of serious injury was found. N
constant relationship was found between the accelerations mea
ured on a dummy and those on a cadaver in these head impact
No positive conclusions can be drawn concerning the protectic
provided in car-to-car side collisions unless the dummy's beha
ior yields a head impact velocity close to that of the huma
head, which does not occur when the shoulder acts as a brac
and when the chest deflects insufficiently. HIC 1500 can
determined in impacts using a separate head rather than th
complete dummy. For chest side impact experiments, the inj
ries found were essentially rib fractures. The number of fra
tures can be an injury level indicator. Correlations were mac
between the number of fractures and the force applied to th
chest, and also the relative deflection of the chest and th
thoracic acceleration. Chest protection criteria can be esta
lished when an appropriate anthropo-dynamic dummy has bee
developed and tested. On the basis of pelvis impact experimen
and other studies, 80 to 90 g/3msec to the pelvis seem to be
conservative level of human tolerance. For a Part 572 dumm
protection criterion, a level of 90-100 g/3msec could be consi
ered. For the experimental condition of the side wall stoppir
the thorax without head impact, it is concluded that there is
need for a neck protection criterion.

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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p359-73
1979 ; 14refs
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HS-028 413

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS

Injury-predictive models of the severity of blunt thoracic trauma have been developed using the data gathered in a series of impact tests utilizing 18 cadaver subjects. Two classes of tests were conducted to generate various levels of injury: tests on an impact sled where the subjects interacted with padded or rigid side door structures in side impact; and controlled energy impacts delivered to the side of the thorax using a flat-faced pendulum impactor. The instrumentation which was designed to monitor kinematics consisted of a matrix of accelerometers surgically placed on the bony exterior structure of the thorax. The active axes of the accelerometers were chosen to represent the three orthogonal axes, and hence, to provide information on direction of impact. After the tests, autopsies were performed to obtain a level of injury reported as an Abbreviated Injury Scale (AIS) number. The injury-predictive models have the AIS number, the number of rib fractures, or derivatives thereof, as the dependent variable and various features of the time-dependent acceleration traces as the independent variables. The features which show the greatest correlation with the level of injury, and hence, which hold the greatest potential for building injury-predictive models have been found to be quantities related to velocities or integrals of acceleration pulses. After quantities such as these were derived from the accelerometer traces, those with the highest correlation to injury measures were selected as candidate independent variables. The predictive models, were then generated using regression software.

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1979 ; 3refs
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HS-028 414

PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS

The method of equivalent accident characteristics (EAC) is described as a means of correlating dummy load (DL) values obtained in computer simulations with injury severities (Abbreviated Injury Scale values) determined by in-depth investigations of real accidents. DL's of certain body parts are separately investigated and described as a function of all main parameters which make up accident characteristics (AC), by computer simulation. The AC's comprise such parameters as velocity, mass, stiffness, design characteristic, deformation, and intrusion. The EAC is a measure of accident severity by the extent of injuries to a body part, and shows the influence of the different AC's. Two examples are presented for determining the EAC (side impact, occupant on the struck side; and frontal impact, belted driver and belted occupant).

by Hermann Appel; Florian Kramer; Jens Hofmann
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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p383-90
1979 ; 6refs
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HS-028 415

CONSIDERATIONS IN SIDE IMPACT DUMMY DEVELOPMENT

Side impact crashes produce a significant portion of total fatalities and injuries in U.S. traffic accidents, and accident data indicate that the injury susceptibility of occupants in these crashes increases with the level of crash intensity and occupant age. The National Hwy. Traffic Safety Administration has initiated a program to upgrade the requirements of Federal Motor Vehicle Safety Standard 214, Side Door Strength, by replacing the current static loading test with a dynamic test. An impacting device will be used to simulate a striking vehicle and an anthropomorphic test dummy to assess the human injury hazard within the struck vehicle. A method of assessment which determines the most appropriate test conditions and levels of protection for those conditions is also necessary before promulgation of the new rule. Attenuation of the intensity of the crash environment appears to be the most feasible way to reduce injuries and fatalities. By initially using the level of crash intensity as the measure of desired performance and subsequently transferring that desired performance to an equivalent set of measurements on an anthropomorphic dummy allows utilization of a dummy system that is representative of any portion of the population at risk.

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National Hwy. Traffic Safety Administration, Washington, D.C. 20590
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1979
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HS-028 416

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE

The National Hwy. Traffic Safety Administration's (NHTSA) proposed development plan for an advanced test dummy to serve the long-range U.S. Vehicle Occupant Crash Protection upgrade needs is discussed. Although the current regulation dummy can be used for evaluating occupant injury countermeasures, a dummy is required which can more realistically simulate global human response. The five major areas of the development program are discussed: review of field accident data, biomechanics research, dummy design characteristics, definition of the dummy and the scope of its application, and legal considerations. NHTSA, through Docket 79-05, is actively soliciting from the international community proposals and research data for incorporation into its program. A list is presented of 20 items for initial discussion requiring input by interested parties to initiate the program. The major milestones in the program call for an advanced notice of proposed rulemaking (ANPRM) by early 1980, an NPRM in the fall of 1983, and the issuance of the rule by early 1985.

by Stanley Backaitis; Mark Haffner
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p395-407
1979 ; 10refs
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HS-028 417

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS

Research is described for improving the human response characteristics of the Part 572 dummy in side and frontal impacts. Biomechanical data were obtained in free-fall, side impact experiments using human cadavers in order to determine the force/deflection characteristics of the human chest. Using the experimental data, the Part 572 dummy's thorax was redesigned for improved response during side impact conditions. Modifications were made to the Part 572's shoulder assembly to give it the range of motions observed for cadavers in vehicle crashes. Modifications were also made to the Part 572 arm, in order to improve its deformation characteristics. Results of dynamic testing of the redesigned dummy are described: frontal impact tests were compared with those of the Part 572 dummy, and side impact tests with those of the human cadavers. Frontal impact tests using Part 572 dummies and cadavers, both restrained by three-point belts, indicated dissimilarities in their submarining behavior. Differences between the Part 572 and human being pelvic areas, and some modifications to the dummy pelvis to align its submarining behavior to human response are described.

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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p407-16
1979 ; 6refs
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HS-028 418

EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES

A 12 accelerometer instrumentation array developed for use in cadaver experiments on thoracic injury has been adapted for ATD (anthropomorphic test device) installation. Accelerometers around the periphery of the Part 572 chest register different acceleration signatures for different directions, levels, and time durations of impact. A series of modifications has been made to the ATD to improve the side impact response of the thoracic regions. These modifications ranged from slight changes in structure to radical altering of the thoracic lateral dynamic stiffness, mass distribution, and rib linkages. When a series of side impact tests was conducted using the modified ATD's, their response was similar to the mean cadaver-based response. The modified thoracic structures are prototype designs which are intended for lateral impact use only. The use of injury-predictive models to predict thoracic injury levels using kinematic data from the modified ATD test indicates that this is a promising approach to injury assessment.

by John W. Melvin; Delmar H. Robbins; J. B. Benson
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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p416-27
1979 ; 5refs
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HS-028 419

A NEW DESIGN FOR A SURROGATE SPINE

A surrogate spine suitable for installation in a 50th percentile anthropomorphic test device (Part 572 ATD) was designed, fabricated, and tested. The design was based on the synthesis of a planar linkage joining two rigid bodies. Its length and the location of pin joints were determined by means of an optimization program which minimized the error of the relative motion between the pelvis and the first thoracic vertebra in the least squares sense. The design was based on experimental data obtained from cadaveric impact experiments. The physical model of this spine link is 464 mm long and was made to fit within the spinal box section of a Part 572 ATD. The upper pivot is superior to the box section and the lower pivot is in the pelvic area. The rubber spine and the weights within the box section were removed. The rib cage could swing approximately 13 degrees about the upper (T1) pivot. Sled impact runs were conducted with the surrogate spine and its dynamic response compared favorably with that obtained from living human and cadaveric tests, although it is noted that T1 Kinematics of the Part 572 dummy are not comparable to human data.

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DOT-HS-5-01232
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HS-028 420

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION

The concept of compatibility is applied to the determination of realistic barrier impact test conditions for evaluating the occupant protection of passenger cars. Compatibility involves the design of a vehicle front structure to ensure protection of that vehicle's occupants in the event of a head-on collision, either single or vehicle-to-vehicle, as well as the protection of the occupants of other vehicles which are hit in the side by that vehicle. For type approval (compliance with government regulations), a new vehicle undergoes crash testing. The primary test is the impact into a rigid barrier at the same predetermined speed, for all vehicles. This test condition makes no allowances for the varying risk of injury which occurs in road accidents involving vehicles of different weights. With the aid of the compatibility concept, a correlation is made between the barrier impact speed and the overall risk existing in actual road traffic from the mass of the vehicles involved. For heavier vehicles, the test impact speeds should be lower; for lighter vehicles, they should be higher.

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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p439-44
1979 ; 7refs
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HS-028 421

IMPROVED TEST PROCEDURES FOR SIDE IMPACT

The development of new impact test procedures for European legislation on improved car side impact protection is described. A full-scale side impact of a mobile barrier with the side of a car is a desirable test of the protection provided for car occupants. The loadings on the head, torso and pelvis of a specialized dummy are essential parameters of such a test; dummy acceleration levels are not sufficient as they fail to detect crushing injuries. The impact may conveniently be perpendicular into a stationary car under test and representative of a vehicle striking at 50 kph between the A posts and rear wheel arch. A small rigid faced barrier 1m wide, 600 mm high and 200 mm above ground with edge radii of 75 mm striking the car under test at 35 km/h is a good representation of this situation. Results show the need for strengthening the side structures of some cars, particularly to maintain tensile strength from A post to the rear through the door hinges and latches. A high tensile strength for the B post and its ends is particularly important. At the same time the need for the components on the inner faces of doors to be sufficiently soft to dummy impact is also demonstrated and energy-absorbing padding may usually be needed. Some current car designs come close to passing the suggested test. Auxiliary tests of the padding or suitable design of the side components that might possibly be struck by the head are also necessary. It would be desirable to improve compatibility between car fronts and car sides of different designs. Testing with a rigid faced mobile barrier is a means of checking this, if load cells are fitted to the barrier face. It appears that a suitable procedure for compatibility testing would be: to impact the stationary car head on using a 2 m wide 1100 kg mobile barrier at 40 km/h, recording barrier deceleration and load cell forces, and to impact the same car at 90 degrees into the driver's R point, using a 1 meter wide 1100 kg mobile barrier at 35 km/h, recording barrier deceleration. Whether the face of the barrier be rigid or deformable, its shape, positioning and design are critical factors for the designs of cars that would have to meet the regulatory side impact test.

by Ian D. Neilson; Slade Penoyre; S. P. F. Petty; Alan K. Dyche
Transport and Road Res. Lab., England; Motor Industry Res. Assoc., England
Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p444-55
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HS-028 422

SIDE COLLISION

The most significant variables in side collisions are discussed and illustrated with experimental results: contact zone, collision direction, velocity, and models of cars involved. A test with both cars in motion is compared to one involving a moving car and a stationary car. Tests using rigid vs. deformable, moving barriers are also compared. The deformable, moving barrier used by Fiat in its crash testing program is described (variable weight, front face honeycomb modules). Some results using this barrier show good agreement with car-to-car test results. The use of Fiat's dynamometric barrier in crash testing and mathematical models provides a methodology for evaluating occupant and vehicle behavior for different car models. This approach greatly reduces the number of cars which actually have to be crash tested and provides more information. Six tests are sufficient to provide evaluation data on both cars (occupants included) for 15 different collision types.

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Publ: HS-805 199, "International Technical Conference (7th) on Experimental Safety Vehicles," Washington, D.C., 1979 p456-76
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HS-028 423

LATERAL COLLISION TESTS

The results of a large-scale program to investigate lateral crash test procedures are tabulated. The program was designed to evaluate whether the proposed ECE (Economic Commission for Europe) test procedure WP 29-463, Rev. 1 (35 km/h rigid mobile barrier test) is appropriate and realistic for side collision simulation, and to establish a fundamental data base for the development of a possible test procedure and performance criteria for lateral collision simulation. Car-to-car crash tests using same model cars, ECE barrier-to-car tests, and car-to-car crash tests using different model cars were conducted. Results show that the ECE barrier test and car-to-car tests are not comparable in terms of impacted car deformation, and dummy behavior. Although a complete test procedure cannot be specified at this time, it is suggested that the struck car be stationary, and that the impact angle be 90 degrees with the center line of impact aligned with the front occupant of the struck car. A mobile, deformable barrier is being developed to provide a more realistic simulation of lateral impacts. A dummy suitable for side impact tests must also be developed.

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1979
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HS-028 424

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION

In the National Hwy. Traffic Safety Administration's 1977 rulemaking plan, improvement in side impact protection was formally established as a top priority. This plan calls for a Notice of Proposed Rulemaking (NPRM) on an upgrade of Federal Motor Vehicle Safety Standard 214 in 1980. Research projects are underway to generate data on how occupant compartment integrity can be improved and how occupant injuries can be reduced by changes to the side structure and by modification of the interior of the vehicle. The upgrade program contains four major areas of activity: development of a test procedure, including the development of a moving barrier impactor; development of a dummy and associated performance criteria; development of vehicles that can be used to demonstrate performance; and analysis of accident data to support the other three activities. Progress to date in these areas is reported; and cost, weight, and leadtime studies are briefly discussed. A schedule of the total program is provided, with anticipated dates for dummy, barrier impactor, and rule NPRM's.

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National Hwy. Traffic Safety Administration, Washington, D.C. 20590
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1979 ; refs
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HS-028 425

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)

Accident and biomechanical data presently available on lateral collisions are reviewed. Results are summarized from initial lateral impacting of the Renault E.P.U.R.E. (experimental safety vehicle (ESV)) in car-to-car tests. Measures to increase the level of protection offered by the ESV in the preliminary collision tests include decreasing inner structure velocity and improving occupant/structure contact. An estimation is given of the increase to the vehicle mass to improve lateral impact protection. Structural reinforcement of the vehicle to decrease inner structure velocity, and padding of the inner structure to improve occupant/structure contact are described. To highlight the progress resulting from these modifications to the E.P.U.R.E., results of a lateral collision test between a Renault 14 and the ESV are compared with those of a collision between a Renault 14 and a Renault 5 conducted under identical conditions. While the reproducibility of the collision test results has not been verified, it is noted that the E.P.U.R.E. level of side impact protection performance has been achieved at the cost of a reduced width at the vehicle window-sill, difficulty in actuating seat controls, and increased weight. The Part 572 dummy is considered unreliable in testing lateral impact.

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1979 ; 20refs
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HS-028 426

IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT

The selection of obstacle and impact point, and approach speed for the conduct of side impact tests is described (the most typical side impact being the car-to-car impact at 50 kph, 75 degrees or 90 degrees). Studies of the behavior of occupants in a side impact have indicated that change in speed of the struck vehicle, and intrusion into the passenger compartment are less important parameters in terms of accident severity than previously believed. Instead, the seriousness of the side impact is controlled by two simple physical parameters: the impact spee between passenger and inner wall of the vehicle, and rigidit and energy-absorption characteristics of the area hit by th occupant. A method is presented for calculating passenger t wall impact speed, based upon measurements on the acciden vehicles. Features are described of the Peugeot VSL safet vehicle (derived from the Peugeot 104) for improved safety i side impact.

by Bernard Loyat
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Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p521-30
1979 ; 7refs
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HS-028 427

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS

Results are presented of car-to-pedestrian impact tests usin child and adult dummies and a large V-shaped Prosche 928. O the basis of a literature analysis and the tests performed, it i concluded that a vehicle concept with optimized pedestria protection must meet the following requirements: V-shape front structure, distance from the ground to the lower windshield frame edge of at least 2 m; an energy-absorbing integrate bumper (soft nose); energy-absorbing construction of hood an fenders; and large "effective front area" with minimum stiffening of possible impact zones. Results of car-to-car side impac tests using three models of Porsche V-shaped cars are compare with published test data on pontoon-shaped vehicles. The side impact protection behavior of the V-shaped front car is comparable to that of common European cars. By design changes, th lateral structure could be strengthened. The increased vehicl width of the V-shaped front car is advantageous in side impact but increases the frontal area to its detriment; this width i compensated by a reduced vehicle height. It is concluded tha the V-shaped concept offers a means of reducing passenger ca accident casualties by 10%. It also has an improved air dra coefficient for increased fuel economy.

by Ulrich Bez; Rainer Hoefs; H.-W. Stahl
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Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p530-44
1979 ; 29refs
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HS-028 428

A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.

Data concerning side impact crashes investigated during 1977 i the National Crash Severity Study program were examined i four different categories: car-to-car, truck-to-car, fixed object-to car, and rollover. Fatal crash data for the same period obtaine from the Fatal Accident Reporting System allowed a compar son of the relative lethality of the different crash configuration Approximately three out of five fatalities resulting from sid impact crashes were found to occur when passenger cars ar struck by a truck or fixed object. The remaining fatalities occu in side impacts between cars and in rollovers. A series of fiv different real-world side impact crashes is described (includin photographs) to illustrate the potential disparity in size and mass between some vehicles and objects in side impact crashes. The crashes illustrate that side-door beams can play a relatively insignificant role in reducing intrusion and mitigating injury in such crashes. While side door strength is important, other factors, such as occupant-interior impact, interior deformation, exterior crush resistance, and crush resistance of the striking vehicle affect occupant safety. Additional approaches to side impact protection are needed.

by Peter Cooley; J. O'Day; R. J. Kaplan
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HS-028 429

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA

The National Crash Severity Study (NCSS) is a major accident data collection program whose primary objective is to provide a data base from which statistical relationships between crash conditions and occupant injuries in towaway automobile accidents can be determined and from which the distributions of crash conditions can be estimated. NCSS field data collection operations (Jan 1977-Mar 1979) are described. Statistical data from the current NCSS file (some data missing) are discussed concerning the relationships between occupant injury, and crash mode, crash velocity, and occupant ejection. Efforts in progress address three key issues concerning NCSS data (quality, completeness, and representativeness). Uses of NCSS data in rulemaking by the National Hwy. Traffic Safety Administration are mentioned, as well as in the development of the successor to NCSS, the National Accident Sampling System.

by James H. Hedlund
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Availability: In HS-805 199

HS-028 430

ACCIDENT INVESTIGATION TECHNIQUES FOR SECONDARY SAFETY

Recent progress is described in the U.K. towards developing a multilevel system of accident investigation specifically related to vehicle secondary safety. The application of the national police statistics to determine priorities, the extension of local in-depth investigations for furthering the understanding of injury mechanism, and proposals for an intermediate level system for monitoring changes in vehicle safety features on a sample basis are outlined. The coordination of activities among three teams involved in studying injury causation and alleviation (at the Transport and Road Res. Lab., Birmingham Accident Res. Unit, and Oxford Road Accident Group) is an important part of the work. A procedure is being developed for harmonizing accident investigation techniques (for the study of biomechanics of injury for car occupants in particular) while enabling the teams to retain their own specific objectives and local interests. The current three-year program (1978-1981) of research studies is summarized.

by Barbara E. Sabey
Transport and Road Res. Lab., England
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C. 1979 p563-71 1979 ; 5refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 431

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY

From the viewpoint of the Federal Republic of Germany, data requirements for an effective national traffic safety program are discussed. Available data sources are considered: police, insurance companies, hospitals and health insurance companies, the automobile and car repair industries, research organizations, emergency medical services, and consultants. Inclusion of available data in the national traffic safety statistics is seen as problematic, particularly with respect to data interrelationships and representativeness. The solicitation of opinions (by the Federal Hwy. Res. Inst.) from experts in the field of traffic safety regarding data needs is described. Criteria for selecting the type of data to be included in a national traffic safety data base are listed (based on opinions from the traffic safety experts, and on legislative needs). The question of formulating an optimum strategy of data acquisition, access, and updating is presented. Aspects such as completeness of data, linking data files, standardization of data documentation, training in data collection, and coordination of data collection efforts are addressed.

by Gunther Zimmermann
Federal Hwy. Res. Inst. (Bundesanstalt fur Strassenwesen), Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p571-8 1979 ; 14refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 432

ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION

Japanese traffic accident fatality and injury trends are discussed for the 1968-1977 period. These indicate that 33% to 37% of the total number of accident fatalities annually are among pedestrians, pedestrian accidents accounting for 22% to 25% of the total accident number. An in-depth investigation of 46 pedestrian accidents which occurred in Japan in 1977 is reported. Of these accidents, 18 were the result of a driver violation, 5 were the result of a pedestrian violation, and 23 were caused by the actions of both road users. The pedestrian error for all cases was running out into the road suddenly (in agreement with the cause of most pedestrian accidents in Japan in 1977). The 46 accidents resulted in nine deaths, 20 severe injuries, and 17 minor injuries among the pedestrians; 33 of the pedestrians were injured or killed when struck by the vehicle front. The front panel and the hood showed the highest potential for severe injury (Japanese Abbreviated Injury Scale). The highest number of accidents involved children. National statistics for 1977 show the highest number of pedestrian fatalities among children under six years of age. In most of the investigated cases, the vehicle impact speed was directly proportional to injury severity.

by Masahiro Itoh
Japan Automobile Res. Inst., Inc.
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p579-87
1979 ; 8refs
Conference held in Paris, 5-8 Jun 1979. Research sponsored by Japanese Ministry of Transport.
Availability: In HS-805 199

HS-028 433

COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS

Results are presented of an in-depth analysis of some 3000 injury-producing pedestrian accidents which occurred (1975-1976) in the Federal Republic of Germany. In over 50% of the cases, the pedestrian contacted the outer third of the car front end. Head and leg injuries were the predominant injuries. Elderly adults sustained more fractures of the lower limbs, pelvis, and upper thigh areas. Children had a high incidence of head, torso, and upper thigh injuries as a result of their relative height. Twenty percent of the injured pedestrians were between six and nine years of age, a factor which should be taken into consideration in the design of the car front end. There was some advantage for the V-shape over the pontoon shape for vehicle front ends in terms of overall injury severity. However, differences were found among vehicle shapes with regard to injury of individual body areas. Lower limb injuries were overrepresented with the V-shape; pontoon shape cars had a higher incidence of abdominal and upper thigh injuries. Serious/fatal head injuries were equally distributed. Risk zones for the V-shape are lateral and upper windshield frame, windshield, and bumper/front end area. For the pontoon shape, these zones are rear and front parts of the hood, and lower section of the windshield frame.

by M. Danner; Klaus Langwieder
HUK Verband (German Assoc. of 3rd Party, Accident, Motor Vehicle and Legal Protection Insurers), Automobile Engineering Dept., Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicle, Washington, D.C., 1979 p587-610
1979 ; 19refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 434

A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.

An analysis was made of 11 traffic accidents which were associated with an inappropriate steering action of the driver. Some essential details are given on the driver, vehicle, road and weather conditions, and course of accident. The accidents were grouped into four categories: turning, lane change, avoiding an oncoming vehicle, and inattentive driving. In all groups, it was found that the accidents are attributable to the fact that the drivers' subjective judgment of safety was more optimistic than the objective one. The drivers' errors can be broadly grouped as wrong prediction of vehicle response to steering action, and misjudgment of safety margin. Closed-loop tests (turning, lane changing) were conducted on a test track to investigate the quantification of driver subjective judgment of safety. The results are favorable and indicate the potential of the quantification of subjective judgment for accident prediction using driver-vehicle-environment system models.

by Yoshimi Furukawa; Shoichi Sano
Honda Motor Co., Ltd., Japan
Publ: HS-805 199, International Technical Conference (7th) o
Experimental Safety Vehicles, Washington, D.C., 1979 p610-2
1979
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Availability: In HS-805 199

HS-028 435

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS

The compatibility of vehicle structures and masses in relatio
ship to accident severity for car-to-car lateral collisions w
investigated through in-depth and survey studies of such ac
dents in France. The severity of car-to-car lateral collisio
increases as the mass ratio increases in favor of the impacti
car. This difference of severity is not related to the fact that
impact speed is greater in heavier cars. The risk for occupa
in cars impacted by heavier cars is closely correlated with
poor compatibility of the relative heights of the bumpers a
rocker panels. This increases intrusion and also raises the occ
pant/wall contact speed above the level attained when only
mass ratios and the relative rigidity of parts dissipating
energy of the impact are considered. The protection afford
would be considerably increased by making the lower parts
the side of the vehicle, just above the rocker panel, more ri
in lighter cars. The geometry of the intrusion of the late
walls, in car-to-car collisions, is such in today's cars that
occupant/wall contact speeds decrease from the pelvic le
upwards to the thoracic level. Consequently, there is less risk
head lesion than in lateral impacts against fixed obstacles. Age
known cause of the variation of the severity of thoracic lesio
did not play a significant role in pelvic or abdominal lesions
the accidents surveyed.

by Francois Hartmann; J. Y. Foret-Bruno; C. Thomas; Claude Tarriere
Association Peugeot-Renault, France
Publ: HS-805 199, International Technical Conference (7th) o
Experimental Safety Vehicles, Washington, D.C., 1979 p622-9
1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 436

CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION

Data from an in-depth, at-the-scene study of pedestrian ac
dents have been used in conjunction with data from a stu
using existing police and hospital records to examine the inf
ence of exterior car design, impact speed, and pedestrian age
pedestrian injuries. For pedestrians struck solely by the fronts
cars or delivery trucks, head and leg injuries were found to
the most frequent injuries. The incidence of injury to any part
ular body area increases with overall injury severity. For the
with only minor injuries, leg injuries are more frequent th
head injuries except for the very young child. For those w
non-minor, non-life-threatening injuries, and for those with li
threatening injuries, head injuries were the most frequent. Co
tact with the vehicle is shown to be the main cause of n
minor injuries, and that their severity is dependent on imp
speed, whereas the severity of ground contact injuries is n
Age influences pedestrian injuries in two ways: height a
weight relationship to contact area, and injury tolerance (elde
are more susceptible to injury). The primary vehicle conta

are responsible for virtually all non-minor pelvic and leg injuries, the main sources of injury being the bumper and front edge of hood. Secondary contacts result mainly in head injuries, the main source being the windshied frame, next the hood. The introduction of compliant "pro-pedestrian" front structures designed to reduce pelvic/leg injuries will likely reduce "Wrap Around Distance" to the head contact, resulting in fewer windshield contacts but more with the hood. The hood could be designed in terms of head contact (e.g. elimination of localized stiff areas). Testing of the dynamic stiffness of the vehicle front structure is the most important aspect of pro-pedestrian vehicle structure evaluation.

by S. J. Ashton; G. M. Mackay
University of Birmingham, Transportation and Environmental Planning Dept., England
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p630-40 1979 ; 12refs
Conference held in Paris, 5-8 Jun 1979. Research sponsored by Insurance Inst. for Hwy. Safety (U S.), and Transport and Road Res. Lab. (England).
Availability: In HS-805 199

HS-028 437

A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION

An investigation of pedestrian accidents in France indicated that the most serious pedestrian injuries were those to the head and were the result of contact with the vehicle. Two series of experimental studies of head-to-vehicle impacts are described: vehicle crashes using adult and child dummies, and cadavers; and free-fall impacts of dummy heads onto the front part of a car. The development of a mathematical model of the pedestrian-vehicle collision is discussed, which was validated by experimental collisions. Design features (related to A-pillars, windshield, and hood) are described for reducing injuries due to pedestrian head impact. Research efforts are recommended which include increased collection of accident data, development of vehicle features to protect the pedestrian's head at higher impact speeds, optimization of vehicle front profile and stiffness, increased reconstruction of real accidents, and investigation of protection compatability of adult and child pedestrians. These various studies resulted in the design of pedestrian protection features of Peugeot and Renault experimental safety vehicles.

by Francoise Brun; D. Lestrelin; F. Castan; Andre Fayon; Claude Tarriere
Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, France
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p641-54 1979 ; 7refs
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HS-028 438

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS

Results are reported of experimental simulations of car-to-pedestrian collisions which involved impacting a 50th percentile male dummy by three Volkswagen production cars (Golf, Passat, Micro-Bus) at speeds from 35 Km/h to 50 Km/h. The 90 degree position (walking straight ahead) was simulated. The experimental equipment and procedure are described. Kinematic and load data on the dummy are tabulated, and figures illustrate the movement of the dummy head relative to the various vehicles. These tests represent an initial step in determing vehicle modifications for improved pedestrian protection.

by E. Lucchini; Rudiger Weissner
Volkswagenwerk A.G., Res. and Devel., Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p655-9 1979 ; 4refs
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HS-028 439

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)

Experimental studies and mathematical simulations of car-to-pedestrian collisions which were undertaken in the development of pedestrian protection features of the Renault E.P.U.R.E., an experimental safety vehicle are reported. The research which was designed to reduce the severity of head-vehicle and leg-bumper impacts, resulted in the decision to cover the windshield frame with an energy-absorbing material shaped for compatibility with the E.P.U.R.E.'s aerodynamic features. This feature provides good protection for the head at impacts of 25 Km/h. The zone encompassing the hood, fenders, scuttle, and lower windshield cross member of conventional cars was redesigned. Improved protection was achieved by the following modifications: a hood that covers the bottom cross member of the windshield, the scuttle, and the fenders; a space to allow for deceleration between the hood and the structural and mechanical components underneath; and optimization of the hood stiffness to make best use of the deceleration distance (good head protection provided for impacts of 30 Km/h. The bumper was shaped so as to lower the point of impact on the legs, thus reducing the frequency of contact between bumper and knee.

by Georges Stcherbatcheff
Renault, Res. and Devel. Dept., France
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p660-74 1979 ; 11refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 440

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)

Simulation experiments of car-to-pedestrian collisions using a 50th percentile male dummy and the Audi 100 passenger car are reported. Test results indicate that up to an impact speed of 35 Km/h (50% of pedestrian accidents occurring at or below this speed), adult pedestrians are adequately protected from critical injuries in a frontal collision. For higher impact speeds (up to 50 Km/h), the protection offered by the car front is inadequate. At higher collision speeds, the greatest pedestrian risk is head impact with the hood. In view of these findings, structural modifications were made to the Audi 100 hood to reduce its stiffness and increase its energy-absorbing capacity. These changes are described, and results of impact tests of the modified design are provided which show a 50% reduction in mean impact decelerations, thus considerably reducing the severity of forces to which the skull is subjected. The design modifications will be incorporated with only minor changes in the body design of the next Audi 100 model as a first step towards a systematic effort to improve pedestrian protection.

by Martin Kramer
Audi NSU Autounion A.G., Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p674-88
1979 ; 11refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 441

PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)

Accident data analysis was undertaken to define research objectives for the development of pedestrian protection features for the Peugeot VLS 104, an experimental safety vehicle. Computer simulation studies of pedestrian trajectories in frontal collisions are outlined, as well as dummy head free-fall impact tests, and leg/bumper and pelvis/hood-front impact studies using a pendulum test device. Modifications are described which were made to the hood, fenders, grille, windshield wipers, windshield and its frame, and vehicle front to decrease stiffness and improve energy-absorbing capability. Favorable results are reported from tests of the design changes; the risk of severe injury in the case of 40 Km/h car-to-pedestrian collisions has been demonstrated. It is indicated that the head/vehicle impact speed has been decreased from 14.5 m/sec to 13 m/sec. Bumper tests demonstrated the compatibility of the design in terms of pedestrian and vehicle protection. The design modifications account for a 3.8% increase in cost, and 1.4% increase in weight of the vehicle.

by Jean-Pierre Echavidre; Jean Gratadour
Peugeot, Security Res., France
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p689-98
1979
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HS-028 442

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION

The design of a modified production vehicle (1978 Pontiac LeMans) for improved pedestrian protection through increased vehicle surface compliance is described. This vehicle was selected primarily because it has a molded, flexible fascia forming the exterior of the hood edge and bumper. A pedestrian-injury-reduction design was incorporated by installing specially developed energy-absorbing foam materials (developed in conjunction with Davidson Rubber Co.) in the space behind the flexible exterior fascia and the radiator yoke panel. The rigid, metal bumper structure was replaced with resilient foam elements. Results are presented of the experimental evaluation of the modified design using 5 mph barrier impacts, and eight pedestrian impacts using adult and six-year-old-child dummies. The results indicate that a substantial reduction in pedestrian injuries is possible through straightforward modifications to existing production vehicles. The new design also offers a weight savings.

by Howard B. Pritz
Battelle Columbus Labs.
Publ: HS-805 199, International Technical Conference (7th)
Experimental Safety Vehicles, Washington, D.C., 1979 p699
1979 ; 2refs
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National Hwy. Traffic Safety Administration.
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HS-028 443

SAFER CARS FOR PEDESTRIANS

Tests were conducted using dummies and cars fitted
energy-absorbing bumpers and hood leading edges to exa
the importance of car frontal shape to pedestrian safety. Re
show that with an energy-absorbing front, improved prote
may be afforded for both child and adult pedestrians at in
speeds up to 40 Km/h, providing that extremes of either
sloping or high, near-vertical frontal shapes are avoided.
most acceptable compromise for the child and adult is obt
with a 700 mm high hood and a 60 mm bumper lead.
importance of the bumper height is considered, and sugges
are made for combining the respective merits of the low-
high-mounted bumper. Impact velocities of the head and
onto the hood show how the impact requirements can be m
the design of the hood top and fenders of a car for pedes
safety. The hood top should have a vertical stiffness and d
mation performance which will not produce acceleration
ceeding human tolerance levels when impacted by an
headform at 9 m/sec, a child headform at 6.5 m/sec, an
adult chest at up to 6 m/sec. Hood leading edges and bum
which deform at a constant crush force of 4 kN when struc
an adult dummy require a crush depth of 200 mm to pr
"bottoming out" in a 40 Km/h impact. A secondary bumpe
to 200 mm below and 50 mm behind the primary bumper
be required to reduce leg injury severity. A car designed w
"soft front" incorporating these energy-absorbing features
scribed.

by J. Harris; C. P. Radley
Transport and Road Res. Lab., England
Publ: HS-805 199, International Technical Conference (7th)
Experimental Safety Vehicles, Washington, D.C., 1979 p70
1979 ; 5refs
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HS-028 444

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION

As part of the National Hwy. Traffic Safety Administra
research program to establish the feasibility and practicabil
modifying vehicle exterior structures to improve pedestrian
tection, work is described in the development of a comp
test and methodology for vehicle fronts in terms of pede
leg injury. A local impactor for propelling a 7 lb leg fo
bumper speeds up to 30 mph was designed and built. A se
tests were performed to adjust the impact characteristics
leg form to achieve the best duplication of maximum forc
time to the peak observed in cadaver tests. It was found th
leg form can simulate the dynamic interaction of a pede
leg with the front of a vehicle; that the response of the leg
when impacting a vehicle has a relationship with the sever
the injury produced; and that limiting the response of th
form through vehicle front modifications does reduce pede

trauma. It was determined that by limiting the maximum leg acceleration to less than 100 g's during a 25 mph impact, a protective concept would comply or appear to comply with a standard based on these tests.

by Rolf H. Eppinger; Howard B. Pritz
National Hwy. Traffic Safety Administration, Washington, D.C. 20590; Battelle Columbus Labs.
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p713-24 1979 ; 13refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 445

CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD

In the National Hwy. Traffic Safety Administration's research program to establish the feasibility and practicability of modifying vehicle exterior structures to improve pedestrian protection, four tasks comprise the Federal Motor Vehicle Safety Standard (FMVSS) development process: preliminary analysis of the U.S. pedestrian safety problem to establish a need; countermeasure development (examining the relationship between collision parameters and pedestrian injuries through vehicle testing with dummies and cadavers, and determining vehicle modifications to reduce pedestrian injury severity); development of the methodology and performance criteria for simulation and evaluation of the vehicle modification countermeasure; and an effectiveness analysis to evaluate the injury-reduction potential of the countermeasure. The proposed maximum allowable acceleration for the lower leg simulator is 100 g's, 60 g's for the child upper torso, in 25 mph impacts, using the developed procedure (striking vehicle at bumper and hood edge with body segment impact simulator). The proposed pedestrian impact protection standard is compatible with other standards with the possible exception of Part 581, (Bumper Standard), and FMVSS 208, (Occupant Crash Protection). The new requirements are not expected to keep a complying vehicle from meeting the requirements of these standards.

by Samuel Daniel, Jr.; Rolf H. Eppinger; Daniel Cohen
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p724-38 1979 ; 3refs
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HS-028 446

INTEGRAL OR COMBINED BRAKING SYSTEM FOR MOTORCYCLES

An integral braking system for motorcycles which has combined control of the front and rear brakes is described. In this system, the pedal operates one front brake and the rear brake, while a hand control operates a second front brake which is employed as an emergency brake or correcting device in cases of extremely violent braking. The system also has a pressure-limiting valve sensitive to high load differences. The integral system provides automatic distribution of the braking forces. The right hand is left free to regulate the throttle control, thus contributing to driving safety. The system provides maximum efficiency in braking, avoiding front wheel lockup under all conditions.

by Silvio Manicardi
Moto Guzzi--Brembo, Italy
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p739-43 1979
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HS-028 447

IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED

The association between wheel locking and loss of directional stability during braking, and the need for careful control of braking imposed at each axle of a commercial vehicle are briefly discussed. The matching of braking distribution to adhesion available at each axle is examined. Mechanical linkages and expander mechanisms of conventional heavy-truck brakes (i.e. drum brakes) contribute to braking performance unpredictability. The multi-disc brake concept is explained as a means to reduce the braking problems associated with commercial vehicles. The advantages of the multi-disc brake are direct fluid pressure actuation, giving predictability and low operational hysteresis; frictional consistency; and the avoidance of heat distortion and poor maintenance problems, together with the favorable characteristics of disc brakes, hitherto limited to passenger cars. The viability of this concept in commercial vehicle applications is mentioned as being heavily dependent upon the advanced materials technology of the aircraft braking industry.

by John W. Davis
Dunlop Ltd. Engineering Group, England
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p743-8 1979
Conference held in Paris, 5-8 Jun 1979.
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HS-028 448

HYDRO-AIR BRAKE SYSTEM

A conventional commercial vehicle air brake system was modified by separating the control and energy delivery functions in an effort to minimize the delay between control movement and brake application for improved stopping distances. A minimum number of components connected with the control function were changed. The conventional foot-brake valve and relays were replaced by direct acting relays, placed as close as possible to the brake actuators for minimizing compressed air travel distance. Hydraulically triggered relays, rather than mechanical linkages, were utilized for ease of packaging. This Hydro-Air Brake System achieves optimum response time without compromising the packaging of the piping system to the driver's foot pedal. The system has been applied to both a 16 ton truck and a 38 ton tractor trailer. Comparative data for conventional and hydro-air systems confirm the significant reductions in application delay and stopping distance. The tractor trailer system is fully compatible with European standards and conforms to the requirements of Directives 71/320/EEC and 75/524/EEC. No change in trailer braking characteristics are associated with application of the Hydro-Air Brake System to the tractor.

by Fred W. Boulton
Leyland Vehicles, England
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p748-54 1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 449

AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)

Target discrimination of a short-pulse modulation microwave collision avoidance radar system with microprocessor-based electronic circuitry installed in a car was evaluated in road tests. A restricted radar detection range, imposed by the steering wheel angle, was found to be effective in reducing false target detection, a common problem in studies of automatic collision avoidance systems. Proving ground tests were conducted of the radar system coupled with the vehicle braking system. Correct timing of brake application to avoid collision with a metal pole was found to occur throughout the tests, under various closing speeds and road surface conditions. There were rare instances of minor collisions with the pole caused by fluctuation of the road surface friction coefficient.

by Masami Kiyoto; Norio Fujiki; Toshihisa Fujiwara; Akira Iwabe
Nissan Motor Co., Ltd., Central Engineering Labs., Japan; Mitsubishi Electric Corp., Communication Equipment Works, Japan
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p754-64
1979 ; 3refs
Conference held in Paris, 5-8 Jun 1979. Research sponsored in part by Japanese Ministry of International Trade and Industry.
Availability: In HS-805 199

HS-028 450

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)

The radar-related subsystems are described which were used in the high-technology version of the Research Safety Vehicle (RSV) developed under Dept. of Transportation sponsorship. An FM/CW radar, interfaced with a microcomputer, provides collision-mitigation braking, automatic safe headway control, and driving-related warning messages. The collision-mitigation function of the RSV involves the application of antiskid brakes when radar and other sensor inputs indicate that a collision will take place. The radar processing hardware and associated computer algorithm for this function is optimized with the aid of tape recordings of a large number of different road, traffic, and weather conditions. Separate road tests are used to demonstrate the reaction time of the system in a simulated collision with an expendable target. The headway control system, interfaced with the throttle of the car, permits the keeping of a safe distance behind the lead car, based on the radar's range and range-rate inputs. A warning message appears on the electronic display if the actual distance becomes less than the safe limit. The system, when perfected, is expected to improve safety and fuel economy.

by Erwin Belohoubek; J. Risko; M. Ilovich; W. Lile; J. Rosen; R. Marx; G. McDermott
RCA Labs.
DOT-HS-7-01552
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p764-89
1979 ; 9refs
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HS-028 451

POSSIBILITIES FOR IMPROVING SAFETY WIT THE DRIVER-VEHICLE-ENVIRONMENT CONTR LOOP

Three major phases in the sequence of events leading to a tr
accident are described, including the role of the driver, veh
and environment in each phase: normal ride (enough time
space to avoid an accident); initiation of an accident-avoid
maneuver, e.g. braking, lane changing, (accident could be av
ed by adjusting the type and/or intensity of maneuver);
accident no longer avoidable owing to limited tire-road a
sion, even with extreme maneuvering. For a certain in
speed, the relationship is examined between the time of in
braking maneuver and the necessary mean deceleration to a
an obstacle. The effect of an early driver action on acci
prevention is quantitatively studied for three types of accid
for which statistical data on relative collision speed are av
ble: intersection accident, rear-end collision, and head-on c
sion. The time at which braking would have to begin to a
an accident is first established depending on the relative c
sion speed. This time is subsequently compared with the
quency distribution of the collision speed. It is found that
proximately half of all these collisions could be prevente
each driver would initiate his accident-avoidance maneuver
half to one second earlier. A quantitative analysis shows
vehicle technological improvements to effect a 10% increa
the maximum deceleration due to braking or a 10% increa
lateral acceleration in a lane change maneuver would co
spond to driver action advanced at most by a few tenths
second.

by Kurt Enke
Daimler-Benz A.G., Passenger Car Chassis Design, Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th)
Experimental Safety Vehicles, Washington, D.C., 1979 p789
1979 ; 2refs
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HS-028 452

ANALYSIS OF THE CONTROL SYSTEM "DRIVE VEHICLE-ROAD"

The driver-vehicle-road control system is analyzed in term
deterministic control and compensatory control. The determ
tic control task of the driver relies solely on visual informa
i.e. the course ahead of him. The deviation from the refer
value (course routing, traffic) leads to compensatory co
The more information the driver receives from the vehicle
better he can master the dynamics of the closed-loop sy
Disturbances such as crosswinds, directly affect the co
system by distorting useful information, and indirectly pl
increased stress on the driver. Three criteria used in co
system analysis are discussed: controllability, observability,
disturbability. Development of systems which offer the d
support in critical situations is recommended as an effe
approach to improve active safety; such systems include ant
brakes, steering aids, and active suspensions.

by Wolfgang Darenberg; Ferdinand Panik; Wolfgang Weidemann
Daimler-Benz A.G., Vehicle Res., Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th)
Experimental Safety Vehicles, Washington, D.C., 1979 p80
1979 ; 12refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 453

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS

Measurements related to steering control quality are presented for 14 European 1978 and 1979 passenger car models (front-end rear-wheel drives). The differences between the measured vehicles are relatively small with lateral accelerations corresponding to normal driving in traffic. With high lateral accelerations corresponding to drastic maneuvers, the differences are very great, in certain cases. Some vehicles require a noticeable change in driver behavior during control with high lateral accelerations, if stability is to be retained. The vehicles have only been measured in a weight condition corresponding to the weight of the vehicle and two occupants. In cases of increased load, an even larger spread of measured results can be expected as increased load, in general, moves the center of gravity rearwards in the vehicle, thus increasing the side slip angle of the vehicle. Several measuring methods are apparently needed to describe the driving characteristics of the vehicle. New passenger vehicles still show relatively large differences in driving characteristics, especially in situations with high lateral accelerations.

by Friedrich O. Jaksch
Volvo Car Corp., Sweden
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p815-46
1979 ; 13refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 454

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION

Research on vehicle directional dynamics (handling performance) is described which was designed to correlate subjective ratings and vehicle-measured response parameters, and to compare experimental and theoretical results to check the validity of the vehicle model. On a proving ground, five expert drivers drove an instrumented Alfa Romeo Giulietta in six different configurations of weight distribution and tire inflation pressure. Particular attention was paid to the effect of vehicle speed. The drivers applied a random steering input. For lateral acceleration less than 0.4 g, the "random steering input" procedure gave the same results, in terms of yaw transfer function, as other "open loop" tests (such as step input). This procedure proved to be reliable, quick, and simple. The yaw transfer function parameters, obtained by fitting the experimental results to a simple vehicle model (yaw and sideslip), are in good agreement with theoretical ones both in the absolute value and in speed sensitivity. The greatest limitation of the simple mathematical model is reduced agreement between experimental and theoretical phase lag diagrams. The correlation between subjective rating and the yaw transfer function parameters (regression analysis) is considered satisfactory and encouraging. Further research on a larger sample of vehicles and evaluators is necessary.

by Luciano Chidini; F. Mantovani
Alfa Romeo, Italy
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p846-55, 857-63
1979 ; 8refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 455

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE

A four-wheel steering system was examined as a means of further improving the controllability and stability of the vehicle part of the driver-vehicle-environment system. As a result of the analysis of the four-wheel steering vehicle's open-loop characteristics using a mathematical model, it was concluded that the controllability and stability of the vehicle could be improved. Based on this presupposition, the Course Tracking test simulating normal driving, and the Sudden Lane Change Maneuver test simulating evasive maneuver were both applied to the test vehicle in which the steering gear ratios of front and rear wheels can be independently changed on a lateral motion simulator. Both tests proved that the driver was able to improve his control of the vehicle to a remarkable degree when appropriate positive values were selected as the gear ratios of rear to front wheels.

by Shoichi Sano; Yoshimi Furukawa; Yasuhei Oguchi
Honda Motor Co., Ltd., Japan; Shibaura Inst. of Tech., Japan
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p864-75
1979 ; 5refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 456

IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES

When the reaction time of drivers in a traffic queue was measured in dynamic driving tests using additional high-mounted brake lights on the lead vehicle, it was found that the additional lights greatly reduced the drivers' reaction times. For the last driver in the line of five vehicles, about a 40% reduction in reaction time was realized, both in daylight and nighttime driving. It is concluded that equipping every 5th or 6th vehicle with the additional high-mounted brake lights would be sufficient. A year-long experiment in Washington, D.C. is reported in which the accident rates were determined for three groups of 525 taxis each (one with conventional brake lights, the second with one additional high-mounted brake light, and the third with two additional high-mounted brake lights). The use of one additional light reduced the accident rate by 54%. The reason for a smaller reduction with the two additional lights was related to the combination of brake light and directional signal. Dynamic driving tests are also reported which evaluated the use of a supplementary motorway low beam with the conventional headlamp low beam. A gain in visual range of 50% to 100% was found with the combined system, with only an insignificant increase in glare.

by Hans-Joachim Schmidt-Clausen
Westfalische Metall Industrie Hueck and Co., Federal Republic of Germany
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p875-6, 856, 877-9
1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 457

AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)

The luminous intensity distribution of a brake light was optimized to improve glare reduction and visibility. The discomfort from glare of some prototype lamps was evaluated in the laboratory under simulated night conditions, as well as in actual day- and night-time driving. Outdoor stationary experiments of long-distance visibility under daylight conditions, and day and night visibility evaluations were conducted in road tests. These tests showed that, with clear weather conditions, the brake lights are visible at a distance of over 1000 m (either day or night), and that the glare at night is acceptable even at short distances. The light must be positioned lower on the vehicle body, and must be photometrically aligned in the vertical plane. A modification to present Economic Commission for Europe regulations to allow installation of this new lamp could contribute to driving safety.

by M. Pasta; Paolo Soardo
Istituto Elettrotecnico Nazionale Galileo Ferraris, Italy
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p880-3
1979 ; 2refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 458

A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION

The development of an energy-absorbing underride protective device for trucks is described. The unit consists of a horizontal bumper beam supported by specially designed drop arms. The arms are hinged and supported by energy-absorbing struts using a geometry where specially developed hydraulic cylinders form one side of a triangle, the bumper beam being attached to the extensions of the drop arms. For the hydraulic cylinders, the theory of fluid energy absorption using variable flow control orifices was applied. The novel approach in the underride guard's design is the method of controlling the hydraulic damping force, which is provided by the passage of fluid through an orifice formed by a slot in a liner between the piston and the cylinder wall. The shape of the slot determines the characteristics of the energy absorber. When the latest version of the device was evaluated in full-scale impact tests at 30 mph, results indicated that the car occupants would have been only slightly injured and that the underride guard suffered no damage. The design of the unit does not reduce the truck's ability to negotiate steep ramp angles, and reduces the effects of impact with a roadway obstruction. A sensor in the device activates braking when the reversing truck contacts an obstacle. The system is so sensitive that only 30 kg (66 lbs) force on the beam can stop a fully laden truck and trailer within 75 mm. Weight reduction of the underride guard is currently being investigated.

by Gunter Persicke; James R. Child
Quinton Hazell Ltd., England
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p883-7
1979
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 459

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING

Ten typical examples are provided of the (U.K.) Aut
Assoc.'s Technical Service investigation of current handl
braking problems. Causes of these problems and count
ures to remedy them are discussed. Reasons are given fo
of procedures adopted during automobile development a
approval testing (evaluation of compliance with gove
regulations) to recognize effects on primary safety of
built-in features. General problems with passenger car
from insufficient consideration by the automakers of the
climate, road, and driver behavior conditions in the U.
lack of owner maintenance. Collaboration with manufa
involving substantial design and manufacturing changes,
sulted in enhanced primary safety. High speed towing in
problems were resolved by changes to suspensions and
move from 4 1/2J to 5 1/2J rims gave much needed hig
straight line and cross wind stability to a front wheel dr
Major redesign of suspensions and brakes dramatically in
inherently poor road manners of a rear-engine rear-whe
car. Modification of materials and detail design feature
vacuum servo corrected braking stability of a conventio
previously impaired by changes in temperature and h
On another make, lowering coefficient of friction of bra
and attention to sliding calipers minimized slewing te
Low tire pressures in the interest of driver comfort r
needless sacrifice of safety margin at speed. Redesign o
tires can overcome self-steering on some current vehic
on older or neglected vehicles, injudicious mixing of
ment tires or poor maintenance can have fatal effects
correlation was established between slow speed roller br
results and loss of control under severe braking. Enforce
the revised Ministry of Transport test could eliminat
unstable cars.

by Marcus A. Jacobson
Automobile Assoc., U.K.
Publ: HS-805 199, International Technical Conference (7
Experimental Safety Vehicles, Washington, D.C., 1979 p
1979 ; 5refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 460

INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS

An investigation of a design concept for the rearview
system in Japanese automobiles was undertaken from th
point of human factors, such as real traffic conditions,
dimensions, driver's characteristics (e.g. distance
mirror monitoring patterns, mirrors as an obstacle to
visibility, and subjective evaluations), and various geome
tors. It was determined that convex mirrors with 900
mm radius of curvature are the most effective outside
mirrors. The passenger's door mirror is too far from the
lar fixation field. The outside mirror on the driver's si
provide a field of vision (FOV) enabling the driver to se
m wide plane at 4.60 m behind him. For the inside
mirror, 8% reflectivity is preferable on the night positio
two-position prismatic mirror. The center of the inside
must be located not less than 5 degrees inside the b
FOV. The inside mirror should not be less than 300 m
from the driver's eyes, its right edge at a horizontal a
less than 25 degrees away, and its lower edge at a vertic

not less than 2 degrees away. The fundamental FOV of the inside mirror is 3.6 m binocular (6.7 m ambinocular) width at a distance of 15 m behind the car.

by Seiichi Sugiura; Kenji Kimura; Hiroaki Shinkai
Toyota Motor Co., Japan
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p914-27
1979 ; 13refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 461

U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE

Motor vehicle travel and highway casualties, including pedestrians, in the U.S. are reviewed for the period between 1945 and 1977. The number of traffic fatalities per unit travel in this period has been reduced by a factor of two to three, as a result of improvements in the highway network, in motor vehicle equipment, driving conditions, driver education and other factors. More specifically the safety record of motor vehicles is reviewed by an examination of accidents and of occupant fatalities and injuries in passenger cars and light trucks as a function of model year, based on U.S. accident and casualty experience in each of the three calendar years 1975, 1976 and 1977. Evidence of improvements is manifested as a reduction of fatality and injury risks by 40% to 50% between pre-1969 and post-1974 model years. These and other improvements are examined in the context of Federal Motor Vehicle Safety Standards. Areas where a high effectiveness has been expected but not observed are particularly emphasized and countermeasures either mandated for near-term effectivity or planned for the future are discussed with a sense of priority. For added perspective, progress is also reviewed in the areas of pollution control and fuel economy improvements. The resulting impacts on the consumer and on the manufacturers are examined in view of allegations that the regulatory programs mandating safety, air quality and fuel economy improvements have been unduly costly to the consumer and too burdensome to the motor vehicle manufacturers.

by A. C. Malliaris; Michael Finkelstein
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-805 199, International Technical Conference (7th) on Experimental Safety Vehicles, Washington, D.C., 1979 p934-50
1979 ; refs
Conference held in Paris, 5-8 Jun 1979.
Availability: In HS-805 199

HS-028 462

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979

Thirty-nine papers are presented on a wide range of topics concerning highway safety. Among the issues addressed are seat belt (including passive restraints) and child restraint legislation, seat belt and child restraint performance and evaluation, occupant protection (interior impact) legislation, collisions of motor vehicles with pedestrians (children, persons affected by alcohol), the influence of drugs and alcohol on drivers, motorcycle accidents, driver performance and licensing (medical advisory board), steering wheel impact injury, and roadside safety devices. Also addressed are statistical models of policy analysis, staged collisions (Calspan Reconstruction of Accident Speeds on the Highway 2, and Simulation Model of Automobile Collision computer programs), side impact, mature drivers, driver inattention, school bus safety legislation, accident exposure, and crash and injury studies.

American Assoc. for Automotive Medicine, P.O. Box 222, Morton Grove, Ill. 60053
1979 ; 504p refs
Includes HS-028 463--HS-028 501. Conference held in cooperation with University of Louisville, supported by Health and Safety Associates, Inc. and Motor Vehicle Manufacturers Assoc.
Availability: Corporate author

HS-028 463

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES

A 1975-1976 field accident research study was conducted in New Orleans, La., to determine the percentage and relative risk of alcohol involvement in adult pedestrian fatal and injury accidents; to identify any unique accident types, behavioral errors, or other characteristics that distinguish these accidents from non-alcohol pedestrian accidents; and to study the alcohol use patterns and the drinker classifications of these pedestrians. Extensive data were collected on adult (age 14 or over) pedestrian fatal and non-fatal accident cases, and control groups were established, based on accident and random site sampling. Results indicate that the degree of alcohol involvement in non-fatal crashes is as great as in fatal crashes, with high blood alcohol concentration (BAC) recorded in a surprisingly large proportion of both groups. When pedestrians with a positive BAC were compared with controls matched by site, by age/sex/site, and at random, the risk of accident involvement was found to increase at a BAC of .10% and to accelerate rapidly at higher BAC levels. Although no significant differences were found in accident types, behavioral errors, or predisposing factors between alcohol-involved pedestrians and controls, there were indications that the path chosen by the pedestrian for crossing a road, the culpability of the pedestrian, and the frequency of the pedestrian striking the vehicle were related to the pedestrian's BAC. The results are discussed, including implications for countermeasures and recommendations for further research.

by Richard D. Blomberg; James C. Fell; Theodore E. Anderson
Dunlap and Associates, Inc.; National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Ref: DOT-HS-4-00946
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p1-17
1979 ; 12refs
Conference held in Louisville, Ky., 4-6 Oct 1979. Based on HS-805 249.
Availability: In HS-028 462

HS-028 464

SEAT BELT LEGISLATION

Mandating seat belt use has been shown in many jurisdictions to be the most effective immediate way of significantly reducing death and severe injuries resulting from motor vehicle collisions. Historically, tort law has played an important role in deterring certain types of conduct. It appears that if the common law continues to develop by itself, the seat belt defense will be increasingly recognized by the courts in assessment of contributory negligence. If seat belt defense is to be recognized by law, such statutes should be broad rather than restrictive to provide just penalty for unreasonable behavior on the part of an individual by which he contributes to injuries caused him by someone else's negligent acts (i.e., contributory negligence). Canadian legal cases are cited where the award was reduced because of the plaintiff's failure to wear a seat belt, as well as other cases where the seat belt defense was not recognized by judges. Expert evidence is often relied upon to provide a causal connection between failure to wear seat belts and extent of injury.

by Robert N. Green; Gilbert S. Sharpe
University of Western Ontario, London, Ont., Canada; Ontario Ministry of Health; McMaster Univ., Hamilton, Ont. Canada
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p18-27
1979 ; 9refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 465

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT

In an effort to determine whether drivers with accident experience had a significantly different frequency of electrocardiographic abnormalities than their counterparts, two accident victim cohorts and a third matched accident-free cohort were identified and evaluated. These data suggest that many otherwise healthy drivers frequently suffer an insidious subclinical alteration in electrocardiogram (ECG) patterns. Whether thoracic trauma predisposes an individual to eventual cardiac pathology remains unknown; however, these findings confirm the necessity for increased vigilence and consideration. A detailed epidemiologic analysis of extensive data with conclusions is presented. In present practice, little attention if any is given to possible cardiac involvement, especially in the absence of specific symptoms. In the absence of broken ribs, thoracic trauma is often ruled out. Previous studies have indicated that heart damage may not be recognized immediately because of more dramatic physical injuries, and because some "trauma related" cardiac disorders are transient and other more severe cardiac irregularities are reversible. It was concluded from the study that cardiac damage from bodily trauma is variable and unconnected with age or type and extent of injury. Cardiac damage can occur without fracture to the ribs and/or the sternum. The statistically significant increase in electrocardiographic abnormalities in persons subjected to blunt thoracic trauma supports the hypothesis that cardiac damage results from such trauma. The study results also indicate that electrocardiographic abnormalities will be discovered by repeated ECG tracings at intervals soon after the accident. This early recognition is important to minimize complications and to prevent more serious aftereffects, although nonpenetrating thoracic trauma seldom produces serious consequences unless the myocardium is ruptured or fatal arrhythmias develop. The study sample was too small to make any definitive evaluation of the effectiveness of the collapsing steering column in preventing heart damage.

by P. R. Fine; K. V. Kuhlemeier; M. J. DeVivo
University of Alabama in Birmingham - Medical Center, Dept. of Rehabilitation Medicine, Birmingham, Ala.
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p28-42
1979 ; 9refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 466

PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS

An investigation was made to examine the characteristics of
child pedestrian fatalities. The study sample was divided
three groups of victims, age 1-4, 5-7, and 8-14; analytic
distinct profiles or collision typologies were produced for
group. Pedestrians age 1-4 were found to be involved dispro
tionately in daytime collisions occurring on or near pri
driveways; frequently the child was run over by a motor v
cle which had been set in motion from a parked position. Pe
trians age 5-7 were involved disproportionately in collis
occurring in the hours immediately preceding or follow
school. Such victims tended to be crossing the roadway f
behind a parked car. Children age 8-14 were disproportiona
involved in collisions at night. Frequently, the victim was str
while walking along the highway or when crossing at an in
section. Driver error was apparently not a factor in two-th
of these accidents. Recognition of these differences in charac
istics of fatal accidents is important for developing appropr
countermeasures. Among the recommended actions are desi
ing systems or programs to improve the conspicuity of yo
children (age 1-4), to develop improved and earlier safety e
cation for school children (age 5-7), and to improve night v
bility for older children (age 8-14).

by M. A. Buhlman; R. A. Warren; H. M. Simpson
Traffic Injury Res. Foundation of Canada, Ottawa, Ont., Canada
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p43-56
1979 ; 14refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 467

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT

The history of the nation's first child passenger protection la
traced from its origin as a goal of an Accident Task Forc
1974 through legislative failure in 1976 and success in 1977.
program for statewide implementation, publicity, and evalua
is briefly described and the national impact documented.
Tennessee, prior to Jan 1978, an estimated 9.2% of child
under age 4 were using restraints; in June 1979, the usage
estimate was 14.8%. The ongoing goals of the Tennessee C
Passenger Safety Prog. are: extensive education; improved
forcement; establishment of infant seat loaner programs throu
out the state; and repeal of the amendment allowing trave
the arms of an older passenger. A plea is made to recognize
fact that the current highway toll among very young childre
essentially preventable and that state by state child restr
laws represent the most practical approach toward "immu
ing" the majority of these children against their leading ki

by Robert S. Sanders; Edward L. Casey
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County Health Dept., Murfreesboro, Tenn. 37130; Tennessee
Dept. of Public Health, Nashville, Tenn. 37219
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p57-66
1979 ; 6refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 468

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT

Neither headforms nor dummy heads are currently capable of adequate assessment of localized loadings likely to cause serious disruption of the facial structure. Some interior design concepts, while performing adequately under the Federal Motor Vehicle Safety Standard 201 test conditions, can cause serious injury to passengers' faces, even at relatively low interior impact speeds. The design and preliminary testing of the face-force prototype headform concept is described, incorporating load-sensing elements capable of evaluating facial bone fracture hazard by measurement of localized forces in dynamic frontal loadings, yielding a force-time history in each region of interest. The device can be rugged enough for repeated use, and is compatible with other dummy uses. The faceform was designed and mocked up for incorporation in a Part 572 dummy skull. It employs damped cantilever-beam supports whose root strain is measurable electronically and directly related to the peak tolerable loads over a structural section of the human face. The mock-up has been sized for four facial areas: nasal bones, zygoma-suborbital regions (left and right), and maxilla/mandible area. The force-measuring principles employed could be adapted to up to eight areas within the face, if desired. Prototype testing on a bench-model sensor has demonstrated that such a faceform concept is workable. The device employs off-the-shelf strain gauge transducers and straightforward production techniques. Total additional cost for a production dummy head so equipped would be less than $400, exclusive of the research and development work required to prepare it for production.

by Charles Y. Warner; Jeff Niven
Brigham Young Univ., Dept. of Mechanical Engineering, Provo, Utah 84602
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p67-76
1979 ; 21refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: HS-028 462

HS-028 469

FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY

The National Crash Severity Study (NCSS), a project of the National Hwy. Traffic Safety Administration, collects crash-related data for a rigid sample of accidents within eight sampling areas. An investigation was made of the fatalities for the first 15 months of NCSS, which includes towaway, passenger car accidents. Important factors associated with higher fatality rates were identified and quantified using fatality rates (as found in the file) and modeling techniques (for the separation of correlated factors). Higher fatality rates were computed for accidents involving a single vehicle, a rural setting, large changes of velocity at impact, direct impacts, rollovers and side impacts, and various occupant factors. In particular, occupants sitting in the front seat or near a window, the older occupants, males, ejectees, and unrestrained occupants had higher fatality rates than did occupants without these characteristics. Rollover and ejection, which often occur together, are each independently associated with a higher rate of fatality. Of the two factors, ejection appears more related to a higher probability of fatality than does rollover alone. Further analysis is needed to determine which of these factors are causes of fatality and which are merely indications of the severity of the crash.

by Susan C. Partyka
National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference 23rd) Proceedings," Morton Grove, Ill., 1979 p77-89
1979 ; 3refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 470

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS

Twenty healthy subjects were used in a double blind study to test the two beta receptor blocking drugs, propranolol and pindolol, with respect to their effect on drivers and driver behavior. The driving tests were conducted on a test track. In addition to several psychophysiological parameters and psychomental performance tasks, driver behavior was studied by means of special auxiliary driving tasks. Apart from the effects on the heart and circulation system, predicted on the basis of the pharmacodynamics of beta blockers, a clear change in psychophysiological reactions was established. Beta blockers have a negative effect on psychomotor coordination and reactivity. These results, together with the sedative side effects reported by many subjects, are interpreted as a general reduction of activation due to the ingestion of beta blockers. Specific clinical findings include slower heart rate, although there were variations under different load conditions; loss of the anticipatory effect in the electromyogram; and lower skin conductance level and response. Performance characteristics include impaired concentration and mental performance; increase in reaction times; change in psychomotor ability (coordination in driving a circular course); and increase in subjective feeling of fatigue. In some individuals, an improved performance was noted. Effects of long-term therapy with these drugs could not be determined in this study.

by B. Friedel
Federal Hwy. Res. Inst., Cologne, Federal Republic of Germany
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p90-103
1979 ; 6refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 471

EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA

Two observational surveys were conducted at a one year interval to determine if an educational campaign focusing on pediatricians had been able to increase the use of automobile child restraint devices in selected North Carolina cities. Although usage rates were higher for the follow-up survey, little if any of this increase could be attributed to the educational campaign. It was further determined that possible benefits of higher usage rates for these restraints may be negated by continued high rates of misuse of the restraints by parents. It can be concluded that there does exist a "follow-the-leader" effect in restraint usage such that if parents can be convinced to use restraints for themselves, they may also better protect their children. Conversely, while current data cannot document it, it may also be that increases in adult usage might also result from a well-designed child protection education program.

best copy available

by William L. Hall; Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C.
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p104-15
1979
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 472

INDICATORS OF DRIVER INATTENTION

Traffic accident investigations have shown that some form of attentional failure is a common causal factor in traffic accidents. An overview of the literature suggested four basic attributes, or dimensions, of attentional performance: intensity; distribution; regularity; and mode of control. The indicators of attentional performance have been discussed in two major groups, behavioral and physiological. Behavioral indicators include: drivers' self-assessments of fatigue and alertness, observers' judgments of attention-related driving errors, driver-vehicle performance as measured through vehicle dynamics, drivers' looking behavior (including eye movements, pupil size, and blinking), and performance of non-driving tasks. Physiological indicators include such measures as heart rate and its variability, skin conductance and electrodermal response, and brain and muscle electrical activity. No single measure has been identified which reliably and unequivocally indicates inattention. Under normal conditions, drivers monitor their own attentional performance, and adjust their behavior to what they perceive to be the attentional demands of the task, although little is known about the cues used to assess their own state of attention and what can be done to improve it.

by David M. Zaidel; William T. Paarlberg; David Shinar
Indiana Univ., Inst. for Res. in Public Safety; Ben Gurion Univ., Dept of Industrial Engineering, Israel
Ref: DOT-HS-8-01819-78
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p117-29
1979 ; 36refs
Conference held in Louisville, Ky., 4-6 Oct 1979. Based on part of "Driver Performance and Individual Differences in Attention and Information Processing."
Availability: In HS-028 462

HS-028 473

THE NEW MICHIGAN DRIVER PERFORMANCE TEST

A three-phase study of Michigan's driver license road test was initiated in 1974 and completed in 1977. A pilot implementation of a new Michigan Driver Performance Test (MDPT) has begun, involving four major tasks: the redesign of prior MDPT training materials and development of road test route materials for more efficient and broader use in preparing 12 instructors to develop special MDPT road test routes and train examiners, and in instructing 12 driver examiners to use the MDPT and test route; the selection of road test routes at pilot implementation sites that were representative of the traffic environments in that locality; the pilot implementation of the MDPT in three different sites typical of those examining offices or bureaus serving Michigan's rural, urban, and metropolitan areas (Howell, East Lansing, and Flint); and the implementation and observation of the training programs developed for the instructors and driver examiners. Among the results observed early in the program were increased examiner morale, favorable response by public to the feedback, and more factual and useful information provided to applicants regarding the kinds of practice needed to drive and reduce hazards. Pilot implementation at each site was followed with periodic monitoring of the MDPT program.

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HS-028 474

PASSIVE PROTECTION: PROMULGATION OR POLITICS

The subject of occupant crash protection remains a political cause celebre, with powerful adherents to either side of the belt/bag controversy and a mountain of printed rhetoric. More research is needed to give full assurance of safety of air cushion systems in the areas of small child static deployment injuries, sodium azide toxicity, and diminished adult injury tolerance. On the other hand, there remains the lack of voluntary use of active shoulder belt systems. Only one "passive" restraint system has seen extensive acceptance and use as a true user option. The Volkswagen Rabbit passive belt/knee bar is an outstanding example of design initiative that is yielding excellent benefits and relatively high usage. Among the air bag design options, one system holds the multiple promise of significant and early safety benefits at reasonable cost, while minimizing exposure. An air bag plus active lap belt for the driver only, and a passive belt and knee bolster for right front passenger, together with conventional active/passive belt and warning systems for the remaining seating positions, clearly offer the greatest protection at the least cost of all viable alternatives for large cars. This configuration also presents the unique prospect of large-scale, real-world experience, which is the only real way to answer many of the nagging questions about restraints effectiveness. While it is noteworthy that any 30 mph passive system in broad implementation can probably save about 27% of the "Top-20 Modes" casualties (19.2% of all occupant casualties), further progress appears to be possible, particularly for driver protection. This will only be achieved after the first implementation step is taken, one which the consumer, not just government and the manufacturer, is willing and able to take. The current full-front-seat passive requirement carries with it the danger of consumer backlash because of some side effects of large, vented passenger air cushions. Relaxation of the passivity requirement for the center front seat position would permit greater flexibility in restraint design without reducing the number of automobiles equipped with driver air cushion systems. It would further permit orderly transition into full production, while providing good measures of relative effectiveness of various systems and impetus for a diversity of consumer-choice options.

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1979 ; 22refs
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HS-028 475

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL

Applicability of the MVMA-2D Occupant Dynamics Model originally developed for the Motor Vehicle Manufacturers Assoc. by the Univ. of Michigan Hwy. Safety Res. Inst. in 1974, has been improved by the introduction of new computer routines which facilitate visual evaluation of the computed results by displaying kinematics of both the occupant and vehicle interior in computer-generated movies. These displays can demonstrate simplified deployment kinematics of inflatable restraints, restraint belt action, occupant neck and shoulder movement, and passenger compartment intrusion. New techniques permit onboard and offboard views of the crash sequence, and one-step processing speeds up the generation of kinematics graphics and movie. The program also provides computer plotting of all output variables for purposes of documentation and identification. To document the practical application of these computer routines, the new developments are demonstrated in simulation of five 48.3 kph (30 mph) frontal barrier crashes which compare the effects of no restraint, lap belt restraint only, lap and shoulder belt, inflatable restraint only, and the inflatable restraint and lap belt combination. Critical response data for analysis in this mode-of-restraint parameter study are presented in a computer drawn relative-performance "star chart" which identify significant elements in a specific crash for quantitative comparisons. In the demonstrated form the improved model clearly represents a superior means to provide additional information for automotive design guidance.

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HS-028 476

THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION

A study was conducted to define the biomechanical limits of the protection afforded by current seat belt systems and to describe the nature of the injuries sustained. Particular attention is given to those body areas where loading from the belt itself can cause injury. The results presented are based on a retrospective in-depth field study of occupants who were using three-point belts. The accident sample consists of about 650 restrained occupants, most of whom were involved in frontal impacts. For the head and face, the steering wheel is the major source of injury for drivers. For the chest, three main compromising factors are identified: intrusion into the passenger compartment; additional loading from behind; and occupant age. The progression of chest injury severity, from bruising, through single and multiple rib fracture to thoracic organ injury can also be illustrated. The pattern of rib fracture shows that the ribs loaded directly by the belt, particularly the lower ribs, fracture first. Lower rib fracture can also lead to abdominal organ injury from the diagonal section of the belt. With European belt systems, injuries from the lap section have been largely eliminated; injuries from the diagonal section can limit current belt system effectiveness against abdominal injuries. Results of the study are discussed with reference to human tolerance and current test procedures. The two most important factors limiting restraint performance are intrusion and additional rear loading, without which restrained occupants rarely sustain life-threatening injuries. It is noted that the distributed frontal barrier test is not particularly representative of real-life accidents, especially as concerns intrusion. Lack of test information precluded estimates of cases involving under-run, which usually involves high-level intrusion. Seat belt restraint efficiency in side impacts was noted. The effectiveness of frontal impact dummies in evaluating side impacts is questioned, since the dummies appear to slip out of the diagonal section of the belt. It is noted that injury criteria are not needed for the neck and abdomen with current restraint systems and that femur criteria seem inadequate as the sole assessment of leg injury potential, since a significant portion of leg injuries involves injury beneath the knee.

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Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p162-76
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HS-028 477

IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?

Accident cases involving school buses were studied in depth by the Ecole Polytechnique and McGill University Multidisciplinary Accident Investigation Teams over the past few years. The accident mechanisms, the results, and the causal factors are outlined, with principal focus on design, deficiencies in maintenance, driver training, and attitudes. Existing safety standards relating to school buses are discussed, along with proposed governmental safety standards. The Quebec Provincial Government has formed a Commission looking into bus safety whose main concern is driver training and vehicle maintenance. This task force was appointed by the government to document the numbers of unsafe buses operating within the Province of Quebec, to determine to what degree they are unsafe, to make recommendations for improving the safety of those meeting a minimum standard, and to prevent those determined unsafe from operating in the future. The results of this commission's findings and regulations and methods to improve the school bus mode of transportation are discussed. Principal recommendations made by the Commission to the Provincial Government are included.

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Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p177-84
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HS-028 478

PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS

Data obtained from existing hospital and police records are used to describe the general pattern of injury sustained by pedestrians in Birmingham, England during 1976. It is shown that although head, leg, and arm injuries were the most frequent injuries sustained, the exact pattern of injury was influenced by many factors, such as pedestrian age, vehicle type, location of initial pedestrian contact with the vehicle, and overall injury severity. In general, pedestrians contacting the sides of cars sustained fewer serious pelvic and leg injuries than pedestrians struck directly by the fronts of cars. Pedestrians struck by the fronts of buses or heavy goods vehicles sustained fewer serious pelvic and leg injuries and more serious chest, arm, and head injuries than pedestrians struck by the fronts of cars. Pedestrians struck by motorcyclists generally sustained fewer serious pelvic injuries and more serious arm injuries than pedestrians struck by the fronts of cars. The incidence of serious head injuries decreased and the incidence of serious pelvic, arm, and leg injuries increased with age. The likelihood of injury to any particular body area was found to increase with increasing overall injury severity. Leg injuries were generally more frequent than head injuries for survivors with minor injuries; the converse was true for survivors with non-minor injuries. Although head injuries were the main serious injuries sustained by survivors, many of these caused only short periods of unconsciousness. If these injuries are not considered as serious, leg injuries become the most frequent serious injuries sustained by survivors. Head injuries were the most frequent serious injuries sustained by pedestrian fatalities. Tables are included, showing the body area distribution of injuries by age and accident type for various injury severities.

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HS-028 479

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE

Traffic offenses related to chronic medical conditions and the effect of a Medical Advisory Board (M.A.B.) for Driver Licensing are discussed. The accident and violation ratios of 19,110 Texas drivers with medical limitations were studied. Ratios before and after Board review were compared in each category of illness and in each age group and related to the state average. The effect of M.A.B. was good for all categories of illness with the exception of limitations related to psychiatric and addiction disorders. The accident ratio of all drivers with chronic medical conditions improved by 51%; traffic violations improved by 21%. The effect of the M.A.B. review may be explained by a variety of reasons: mathematical regression of the accident ratio; deterrent effect of the action; complete elimination or restriction of the impaired driver from the road, or reduction of the driver's mileage. All of these factors may contribute, but do not fully explain the effect of M.A.B.

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HS-028 480

YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES

A series of tests was developed in response to the need for a subtle attitude measure of the effectiveness of formal education programs directed at reducing the frequency of drinking and driving. The tests were generated as the final product of a rigorous and objective process of test development which comprised the following steps: defining criteria, developing preliminary measures, pre-testing, item validation, test refinement, and test validation. The results of this process are a useful obvious measure and useful subtle measures for determining youthful attitudes toward drinking and driving. The obvious test, "Drinking and Driving: What Do You Believe?", is a scaled test of beliefs which can be used when honest answers are expected. Two subtle tests are called "What Are the Facts?", a pseudoknowledge test, and "What's Going On?", a picture interpretation test. These tests can give results when honest attitudes are harder to elicit.

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HS-028 481

ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION

Driver exposure to the risk of an accident is a variable which has been difficult to measure and frequently ignored in epidemiologic studies of traffic accidents. To study exposure, 3000 drivers living in Metropolitan Toronto were interviewed by telephone during 1978, to assess the amounts and types of driving they had done. Drivers had been selected at random from provincial records to include drivers from six different groups: males with 0-2 points, 3-5 points, 6-8 points, or 9 plus demerit points and females with 0-2 points or 3-5 demerit points. (Demerit points are assigned when a driver is convicted of one of 26 traffic offenses.) Women had driven fewer miles than men at the same level of demerit points, for each type of driving (city, highway, rush-hour, night). Within each sex, drivers with more demerit points had driven significantly more than drivers with fewer demerit points. The actual number of convictions and collisions experienced by the sample of drivers was obtained from provincial records. Rates of collision and conviction were calculated using persons and person-miles in the denominator: when account was taken of the mileage, women had higher collision rates than men with comparable demerit points. Furthermore, drivers who typically drove small amounts each week (under 120 miles/week) had a much increased risk of collision per mile, which was even greater if the driver had acquired demerit points. Drivers with greater mileages per week had a relatively low risk of accident per mile which was not altered by the number of points. Results suggest that licensed drivers need to maintain their skills with frequent practice. Low exposure drivers may also have a higher risk because of a greater proportion of city driving, where the combination of intersections, traffic signals, and the like seems to produce a high risk for the inexpert driver.

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HS-028 482

AN ON-THE-SPOT STUDY OF MOTORCYCLE ACCIDENTS IN NIGERIA

An on-the-spot study of 201 motorcycle casualties in Nigeria showed a high percentage of possession of crash helmets following the crash helmet legislation in the country. Motorcycle accidents consisted mostly of collisions with cars and trucks. Head and neck injuries were the most common type among persons who died at the accident scene; lower limb injuries were the most common type among those taken to the hospital. It is recommended that helmet legislation include specifications for proper wear to ensure that helmets are in place when they are most needed, and that users be informed about the limitations of crash helmet protection. Also recommended are bright wearing apparel, reflective armbands, and daytime use of head lamps to increase conspicuity of motorcyclists and to decrease the risk of collision with other vehicles. Reduced importation of powerful motorcycles is also recommended as a measure for reducing motorcycle crashes.

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HS-028 483

55 ALIVE/MATURE DRIVING

"55 ALIVE/MATURE DRIVING" has been developed as a community service program for motor vehicle operators age 55 and over. The program is the first comprehensive nationwide course designed to deal with the special interests and needs of this age group. The six-session course includes information which research has shown will help older drivers update driving knowledge, sharpen skills, and remain on the road longer. The six sessions cover the following topics: overview of driver characteristics in the 55 and over age group; physical changes (impairment of vision and hearing, slower reaction time, effect of medication); perception in specific driving environments; rules of the road (right-of-way, intersections, turning, passing, backing, freeway entrance and exit, and lane changing); accident prevention measures, adverse driving conditions, and other road users; and local driving problems and license renewal. The program is currently being pilot tested in California, Florida, Illinois, and Virginia. More than 10,000 older drivers are participating in the project. The effectiveness of the course is being evaluated by the Dept. of Transportation. It is hoped that the program can emerge as a national model for traffic safety officials.

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HS-028 484

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO

In Jan 1976, legislation became effective in Ontario, Canada, requiring the use of seat belts. In Feb 1976, the seat belt legislation was enforced for the first time and speed limits were lowered on many of the major highways. The evidence is examined that shows that both seat belts and lower speed limits have been effective in reducing injuries and saving lives. Included are the trends in observed seat belt use, trends in travel speeds, fatality and injury rates with and without belts, accident statistics on highways where the speed limit was lowered compared with highways where the speed limit was not lowered, and fatality and injury rates for vehicle occupants compared with other motor vehicle accident victims. It is concluded that the observed reduction in the fatality rate and in the non-fatal injury rate for vehicle occupants can be attributed to the combined effect of seat belt legislation and the speed limit reduction.

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HS-028 485

WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY–DATA FROM FOUR MAJOR CANADIAN CITIES

A report is summarized which was prepared for the Minister of Consumer and Corporate Affairs of Canada on the use and suitability of currently available vehicle and auxiliary restraint systems for the protection of child passengers in crash situations. Information from current literature and selected experts was reviewed on the technical, medical, and some legal aspects of child restraint systems. A study of parents' utilization of car seats or seat belts for their young children was carried out simultaneously in Montreal, Toronto, Calgary, and Vancouver to find out the degree of use as well as the factors related to such use. Telephone interviews were conducted with 902 parents of children aged 6 years and under. Analysis of the questionnaires indicated that the parents could be divided into six groups: those who have a car seat, always use it (32.9%); those who have a car seat, sometimes use it (14.2%); those who have a car seat, never use it (12.5%); those who previously had a car seat (21.5%); those who never had a car seat (15.0%); and those who never heard of a car seat (3.9%). Direct observations were also made of the methods by which child seats have been installed by looking through the vehicle windows in parking lots. Limited information on the performance of child restraint systems in actual collision situations was derived from accident records and reports. It is concluded that more comfortable and more convenient child restraint seats would lead to increased usage. It was found that use of car seats is greatest for children ages 1-2 years and that usage decreases as the child grows older; at ages 4-5 years, the child is considered too large for a child seat. Observations indicated that child seats were often improperly attached (e.g. with tether strap unfastened) in spite of the availability of careful installation instructions. It was noted that car dealers were not generally aware of attachment facilities available in General Motors cars. Recommendations include extension of mandatory use legislation for child seats and harness, and application of the tort law to parents who do not protect their children. Promotion of child safety seats by pediatricians, and rental systems for these devices are also recommended.

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Canada-CCA-7485-S49-2-7-0016
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HS-028 486

MOTORCYCLE RIDER COURSE FEASIBILITY STUDY

Applied Science Associates, in cooperation with the Jefferson County School System (near Denver, Colo.) conducted a large-scale feasibility study of the Motorcycle Safety Foundation's "Motorcycle Rider Course" (MRC). Three evaluation criteria used in the study were instructional effectiveness, administrative feasibility, and user acceptance. The course was offered to students within the secondary school system and adults within the community. Based on five separate tests, it was determined that students do gain significant information and skills. These tests were: Pre and Post Test Scores, MRC Knowledge Test Scores, MRC Skill Test Scores, Motorcycle Operator Skill Tests, and Motorcycle In-Traffic Tests. Administrative feasibility was demonstrated by analyzing staff time/task logs, project cost records, and input/feedback from administrators. A high degree of acceptance was indicated by attitudinal data, and student and parent course evaluations. Possible aspects for revision were identified and a preliminary evaluation plan developed as part of a National Hwy. Traffic Safety Administration demonstration project. Revisions included elimination of on-street sessions and refinement of selected course curricula. The on-going demonstration project, to be administered within a state motorcycle operator licensing system, is designed to determine the crash reduction effectiveness of motorcycle rider education courses. A license applicant will be offered the option of obtaining a learner's permit and volunteering for a motorcycle rider education course, or of preparing for improved skill and knowledge tests on his own

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HS-028 487

THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE

The effects of single acute doses of diazepam were examined in eight male subjects using three performance tasks. The tasks included visual search, visual search and tracking in a divided-attention situation, and information processing rate. All subjects received four treatments averaging roughly 9.0, 4.5, 2.3 and 0 mg. At each treatment session, performance was examined at 12 time points in 23 hours after treatment. Significant impairment was found for eight hours after treatment. The behavioral impairments appeared to be dose-related, although not linearly. Comparison of the effects of diazepam to those of alcohol indicates that tracking ability was about equally impaired by a blood alcohol of 0.07% as by a medium (4.5 mg) dose of diazepam. Response times and combined error scores in the visual search task were larger under alcohol than under the highest (9.0 mg) diazepam dose. Impairment of the information processing task by alcohol was midway between those produced by the large and medium diazepam doses. Since the comparison alcohol dose increases the probability of an accident by about 300%, the decrements associated with diazepam are socially significant, indicating that driving or operating machinery under the drug's influence could be dangerous to the user.

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HS-028 488

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY

Using a specially designed reporting form, hospitals in an eight-county area of Central Indiana (population of approximately 1,200,000) reported on randomly selected emergency room visits by category of injury: trauma (restricted to motor vehicle accidents), cardiac, burn, poison, neonatal, and behavioral. A census of all ambulance runs in the region was conducted during the same Fall 1978 period to determine the percentage of runs in response to a motor vehicle accident. When the percentage of motor vehicle trauma victims arriving by ambulance who were admitted to the hospital was calculated, it was found that motor vehicle trauma accounted for 648 cases or 44.4% of all reported cases, and of the 320 cases who arrived by ambulance, 87 or 27.6% were admitted to the hospital. Using an Indiana Hosp. Assoc. figure of 9.5 days as the mean stay for a motor vehicle trauma patient, it was calculated that in the Central Indiana region, motor vehicle trauma accounts for 68,591 bed days per year (3.6% of all region bed days).

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HS-028 489

PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS

Roadside analyses were made for 300 fixed-object crashes (and 300 comparison sites), selected from a population of property-damage-only, nonfatal-injury, and fatal crashes that occurred in three Georgia counties during a five-month period in 1977-1978. The results generally validate the findings of a similar 1974 roadside study in Georgia. Based on both studies, it is concluded that fixed-object crashes are more likely to occur for the following road conditions: along arterial and collector roads, along the right side of the road, along curved sections, along the outside of curves, in the area downstream from a curve, along a road with a negative gradient, and along a road with narrow pavement and shoulder. Approximately 90% of these crashes result from collisions with objects within 30 ft of the pavement edge. The general fixed-object accident site is best discriminated from a comparison site by a combination of curvature greater than 9 degrees and downhill gradient steeper than 3%; for the fatal fixed-object crash site, the corresponding figures are 6 degrees and 2%.

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HS-028 490

MOTORCYCLE ACCIDENT DATA--A VOID TO BE FILLED

In 1978, the American Automobile Assoc. and the Motorcycle Safety Foundation (MSF) surveyed 1475 local jurisdictions (representing a total population of 57,682,291) to obtain basic demographic data on 1977 motorcycle accidents; 88% of the localities responded. The MSF also surveyed the 50 states and the District of Columbia to determine the availability of motorcycle accident data on the state level; 36 states responded, representing a total population of 144,521,000. It was found that the most critical time period for motorcycle use is between 4 PM and 6 PM, followed by the very early morning hours; cyclists between 20 and 24 years old have the most accidents, followed by those 25 to 34 years old. Urban locations have more accidents than rural ones. Only 13 states (36%) could provide information on operator or passenger helmet use at the time of the accident. Accident report forms often fail to provide information on headlight use during daytime operation. There is a critical need for various types of exposure data: motorcycle mileage, motorcycle usage on various highway configurations, and sizes of motorcycle used. Tabulated and graphical information is appended.

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HS-028 491

CHILDREN KILLED IN CRASHES

A series of 89 deaths of children from 0 to 14 years of age in Maryland crashes during 1973-1977 were studied to illustrate problems of inadequate child restraints. Emphasis was on infant deaths, since little attention has been given to the especially high risk of death during the first six months of life. Of the 89 children who died, 87 were not properly restrained, one-fourth of these being ejected from the vehicle (indicating the inadequate design of doors and glass). Eight children were reported to have been traveling on their parents' laps. Of the nine infants less than six months old who were killed, three were in devices unsuitable for use in cars. Other sources of inadequate protection were improper securing of restraints, and traveling in the front seat. Beside proper use of acceptable child restraints, additional ways to reduce the likelihood of child injury include: reducing vehicle travel by children, driving at lower speeds, and using the larger of two family vehicles for transporting children. However, since there is little hope for changing parent and driver behavior to effect the child occupant safety, what is needed are greater use of mass transit, roadway modifications to automatically reduce crash frequency and devices that prevent or reduce injuries in crashes such as air bags, and impact-attenuators. Also needed are vehicle interior designs to prevent occupant ejection and to ensure that possible contact surfaces have a minimum potential for injury. Case reports and crash test photos are included.

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HS-028 492

VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE

Reexamination of roadside safety hardware research is discussed in light of passenger car downsizing. Current roadside protection device designs and performance criteria are based mainly on experience with vehicles in the 2250 and 4500 lb weight range. An analysis of future vehicle downsizing trends suggests that vehicles as light as 1700 to 1800 lb need to be considered, since it is known that crash severity increases with decreasing vehicle weight in collisions with pole-like structures. High-speed, off-center impacts of small cars into such structures may result in violent multiple rollovers. Safety performance criteria for breakaway signs and luminaire supports, base-bending signs, and other poles/supports need to be reexamined. Vehicle geometry, inertial characteristics, and crash properties of mini-sized cars may present special problems in the design of traffic railings. Snagging of support posts and vehicle rollover have been observed in tests with these small cars. Impact attenuators also need to be reexamined. The Honda Civic has been selected as the initial mini-sized vehicle of interest in Federal Hwy. Administration-sponsored research. Current research includes minicar-bridge rail (current) crash testing, and analysis of minicar problems with shaped concrete median barriers. A planned study will investigate minicars and small sign supports.

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HS-028 493

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201

The design of motor vehicle interior features likely to be impacted in frontal crashes (e.g. instrument panels, and front seat backs) are discussed according to the extent to which they are subject to Federal Motor Vehicle Safety Standard (FMVSS) 201. The need to design such interior compartment structures to reduce injuries is especially important for child safety. It is advocated that FMVSS 201 is inadequate, since it is based primarily on likely head impact areas of lap belted adult passengers, and applies only to parts of the top of the instrument panel ahead of center and right front passengers, to very limited parts of the top of the front seat backs without adjustable head restraints, or to the center point on the tops and backs of adjustable head restraints; and to sun visors, arm rests, and some interior storage compartment doors. Studies indicate that these areas are seldom impacted by occupants in crashes. The present standard is a much weakened version of the original standard (31 Jan 1967) which was intended to provide initial, minimum requirements for interior impact protection. The 1967 standard in turn was weaker than the 1966 proposal which included requirements for unrestrained child impact areas. An amended standard proposed in 1970, dealing comprehensively with interior impact protection, was never implemented. Many design features of current model cars increase injury potential (e.g. metal edges, rigid surfaces, hard protrusions, inadequate padding), but are not covered by FMVSS 201. Some automakers have emphasized injury reduction in interior design, illustrating the practicability, aesthetic appeal, and functional convenience of such designs. FMVSS 201 should be upgraded to require much less hazardous designs. Photographs of both potentially injurious interior design, and design features exceeding FMVSS 201 requirements are included.

by Allan F. Williams; Jackson Wong; Brian O'Neill
Insurance Inst. for Hwy. Safety, Watergate 600, Washington, D.C. 20037
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p361-81
1979 ; 41refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 494

A FUNDAMENTAL LOOK AT SIDE IMPACT

Side impact data are analyzed using a method based on th velocity-time histories of seven key points on the colliding vehicles (firewall and bumper of the impacting vehicle, and nea side of the impacted vehicle, side of door (with crash padding on opposite side from occupant, padded door facing occupant occupant, and far side of impacted vehicle). This method exhibits on a single graph the relationship among structural modifications, interior padding, intrusion, change-of-velocity of th struck car door, and human injury criteria. Using the model to analyze a side impact with a dummy and one matched collision using a cadaver, it appears that this method is compatible with current side impact injury levels. Areas on the velocity-time curves are shown to correspond to actual measured distances, slopes of curves to correspond to actual measured accelerations, and vertical lines to correspond to actual measured changes of velocities.

by Charles E. Strother; Richard M. Morgan
Minicars, Inc., Goleta, Calif.; National Hwy. Traffic Safety Administration, East Liberty, Ohio
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p382-96
1979 ; 6refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 495

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS

To improve the utility of the CRASH (Calspan Reconstruction of Accident Speeds on the Highway) 2 and SMAC (Simulation Model of Automobile Collision) computer programs and to assess their limitations, 12 vehicle-to-vehicle collisions were staged and reconstructed using the programs. Results of the CRASH 2 program were judged on their degree of correspondence with the measured impact speeds and changes in velocity. The SMAC reconstructions were assessed on the basis of the accuracy of the predicted final rest positions, damage dimensions, and changes in velocity. In general, the reconstructions from both programs were acceptable. Recommendations to improve their utility include: for the CRASH program, to update the vehicle stiffness coefficients, particularly the rear-end impacts, and add a stationary vehicle option; for the SMAC program, to simulate hard points and corner effects and to provide an option to input cornering stiffness time history data in order to simulate weight transfer effects.

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University of Oxford, Dept. of Engineering Science, Oxford, England
Ref: DOT-HS-7-01511
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p397-411
1979 ; 5refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 496

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN

In order to determine seat belt usage rates in Saskatchewan, Canada, five surveys were conducted between May 1977 and May 1979, at sampling stations across the province on urban streets, provincial highways, and municipal roads. Information was gathered on various driver, vehicle, restraint system, and trip characteristics. The first survey, which was conducted during an extensive publicity campaign, indicated overall usage was just under 20%. When legislation was passed on 1 Jul 1977, requiring all front seat occupants of motor vehicles to use the available safety restraints, usage rates in July had increased to over 50%. Motorists were given a three-month grace period to Oct 1 when enforcement of the law began. Although usage rates had increased to 73% in Oct 1977, by May 1978 they had decreased to just over 55%. Usage rates had leveled off to an average of 70% by May 1979. Cross-tabulations were made between usage and such variables as driver age, sex, education level, participation in driver education, frequency of seat belt use, and accident experience, as well as number of miles driven per year, roadway speed limits, and length of trip. Usage rates were higher for certain variables including: vehicles with seat belt buzzers; drivers in the 26- to 35-year-old age group, male drivers, drivers with high school or higher education level, high speed, and high-volume roadways. It was found that although total accidents and miles/driver/year have increased, injury and fatality rates have decreased since the enactment of the mandatory seat belt use law.

by A. T. Bergan; L. Glen Watson; Debra E. Rivett; A. Carl Shiels
University of Saskatchewan, Saskatoon, Sask., Canada; Transportation Agency, Traffic Safety Programs, Regina, Sask., Canada
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p412-25
1979 ; 6refs
Conference held in Louisville, Ky., 4-6 Oct 1979. Research sponsored by Provincial Government (Saskatchewan).
Availability: In HS-028 462

HS-028 497

MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM?

A review is presented of the limited literature available on the subject of alcohol involvement in motorcycle crashes. Some data are presented from the Fatal Accident Reporting System on alcohol involvement in motorcycle operator fatalities (high percentage of questionable data); from a 1977 survey by the Motorcycle Safety Foundation (MSF) and the American Automobile Assoc. of communities throughout the U.S. concering operator blood alcohol concentration levels in fatal motorcycle accidents; and from the same type of survey by the MSF in 1977 of the 50 states. It is pointed out that the absence of uniform accident reporting systems throughout the U.S. has prevented clear definition of the motorcycle accident/alcohol relationship. Confusing the issue even further is a significant under-reporting of alcohol involvement in these accidents. From the information currently available, it can be said that alcohol is involved in from 3% to 6% of all motorcycle accidents, in 40% to 50% of all motorcycle fatalities in state studies, and in 21% to 28% of all motorcycle fatalities. Single-vehicle motorcycle accidents and fatalities show a higher percentage of alcohol involvement.

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Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p426-31
1979 ; 10refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 498

AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN

A conference was held on 14-15 May, 1978, to provide a forum for information exchange and discussion of public policy regarding alcohol (and other drug) involvement in traffic accidents. The conference design included modifications of delphi technique and nominal group process techniques. Participants included doctors, judges, law enforcement personnel, driver improvement analysts and licensing specialists, educators, and safety council personnel. Discussions involved the identification of individuals who make up the alcohol-involved accident problem, and the traffic system's public policy-generated responses to the individual. It was concluded that most people do not seem to understand the mechanisms of impairment or their consequences, and that the traffic law system for dealing with the drug-abusing driver makes it difficult to force individuals into treatment/rehabilitation programs at an appropriate stage in their abuse problem. Recommendations to promote understanding about drug impairment centered on school pupils, traffic law system personnel, and medical patients; improvements were recommended in the traffic law system itself (fairness, justice, efficiency) and for public perception of the system.

by Richard H. Austin; Gilbert E. Apps
Michigan State Safety Commission
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p432-6
1979
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 499

A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS

Data are presented from the examination of vehicles equipped with aftermarket steering wheels constructed of various materials, that were involved in frontal collisions. The injuries sustained by the drivers of these vehicles are examined, including those specifically caused by occupant contact with the aftermarket steering wheels. Some of the aftermarket steering wheels, such as those constructed of chain link, wrought iron, or hard plastic appear to pose a possible safety hazard to occupants who contact these objects in a collision, but others utilizing a token rubberized foam padding could afford occupants some protection. The wheels that appear to subject occupants to the most risk are those of a reduced size (8-10 in in diameter) and of extremely rigid nonyielding construction. Separation of the metal spokes from the rim has been seen in some instances and these protruding metal objects could also contribute to the injury causation of the occupants. Reduced diameter steering wheels could decrease the drivers ability to control and rapidly maneuver a vehicle. There is sufficient evidence to indicate that further study of the injury-producing effects of aftermarket steering wheels is needed. Handling tests should also be conducted to determine the effect of reduced diameter wheels on driver control and maneuverability. After-market steering wheels should conform to relevant Federal Motor Vehicle Safety Standards. It was also noted that most of the vehicles with aftermarket steering wheels had disconnected horns, thus eliminating a safety feature. Photographs are included.

by Jack D. Baird; John M. Didion; Jerry B. Harmon
Dynamic Science, Inc., Downey, Calif.
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p437-51
1979
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 500

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS

A study was undertaken of rear-facing infant restraints to determine the optimum reclining angle that will provide adequate support for the infant at rest, and the optimum reclining angle that on impact will afford the best back, neck, and head support for the infant without imposing undue loading on the infant's shoulders. Rear-facing restraints were installed on an auto seat with a slope representative of the average seat slope in 1978 and 1979 cars. An infant was placed in each restraint which was then positioned at the manufacturer's recommended reclining angle(s), and the back and head support provided by each was evaluated. These restraints were then impact sled tested as installed on the average-sloped auto seat, and the harness loading on the shoulders of a six-month-old-child dummy was measured for each seat. In the comfort and support evaluation, the infant showed immediate, obvious discomfort in several more-upright restraints, the harness system in some restraints developed slack (resulting in bean bagging of infant's body), and it was indicated that incorrect positioning of an infant in a restraint could result in injury. There is not sufficient consistency in sled test results to draw even a tentative conclusion regarding a relationship between the degree of rotation of a restraint on impact and the total peak load on the shoulder harness. The results suggest that restraint rotation under impact (and dummy stress) increases as the back angle of the restraint becomes more upright. Photographs are included.

by Quentin H. McDonald
Bobby-Mac Co., Inc., Scarsdale, N.Y.
Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p452-79
1979 ; 9refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-028 501

STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)

The use of statistical models for highway safety policy analysis is addressed, stressing the importance of interaction between managers and model analysts for developing and applying these models. An injury prediction model is described which has two phases: estimation of the expected Abbreviated Injury Score (AIS) for a vehicle occupant using a set of crash variables, and estimation of the severe injury rate and the fatality rate in towaway crash by using the expected AIS. Two examples illustrate the use of the crash injury prediction model to analyz questions asked by policy makers within the National Hwy Traffic Safety Administration. The first example involves the economic tradeoff between crash injury and fuel economy associated with vehicle weight reductions. Substantial savings from fuel economy are indicated, a portion of which could be used for incorporating additional occupant protection into vehicles. The second example examines the potential interaction between vehicle size and passive restraints. It is indicated that passive restraints are not likely to provide greater injury reduction in cars under 3600 lbs. Injury severity will be reduced more by passive restraints in large cars partly because occupants of these cars tend to be older people who are more susceptible to injury, although cars under 2200 lb are more favorably affected by passive restraints than are larger cars.

by William L. Carlson
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Publ: HS-028 462, "American Association for Automotive Medicine Annual Conference (23rd) Proceedings," Morton Grove, Ill., 1979 p480-99
1979 ; 11refs
Conference held in Louisville, Ky., 4-6 Oct 1979.
Availability: In HS-028 462

HS-804 188

PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY

Preliminary results are summarized from the National Crash Severity Study (NCSS). The data was compiled over a two-year period (1977-1979) on 6216 passenger car crashes involving 13,525 occupants. At least one car in each accident was disabled. Only 8.4% of the vehicle occupants were wearing seat belts, compared to about 14% of the total population. Nearly one-third of all fatalities, and nearly one-fourth of all seriously injured occupants were ejected from the vehicle; more than half of the ejections occurred in rollover accidents. It was found that the likelihood of an occupant being seriously injured or killed in a side impact is about twice that for a frontal collision. Serious injuries and fatalities were found to generally correlate with higher speed crashes. Half of all the NCSS fatalities occurred in crashes in which the vehicle changed velocity by at least 35 mph. It was determined that some rear occupants, who are seated well away from the point at which an automobile is struck, and occupants who are properly restrained may be less seriously injured than would be indicated by vehicle damage. Some of the NCSS occupants survived crashes at more than 40 mph.

by James H. Hedlund
National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
1979 ; 32p 4refs
Availability: NHTSA

HS-804 979

55 MPH FACT BOOK. 4TH ED.

Background information on the imposition of the fifty-five mile per hour speed limit and its safety benefits is followed by tabular data and graphs pertaining to the speed limit, including data, mainly covering the 1973-1978 period, on motor vehicle fatality rates (by state, per 100 million vehicle miles, by age group, by vehicle class, and for pedestrians); vehicle speeds (exceeding 55 and 65 mph, and average and 85th percentile speeds, by state);

highway travel (millions of vehicle miles, by state); average fuel economy ratios for 10 mph increments in speed for 1965-1970 and 1973-1977 model year cars; and annual arrests for noncompliance, by state. Graphs for each state indicate speed trends from 1977 to the first quarter of 1979. Appended are motor vehicle statistical data: total travel, 1950-1977; annual travel on main rural roads, 1966-1977; annual traffic on main rural roads as percentage of 1965; basic data on traffic accidents, 1957-1977; traffic fatalities, fatality rates, drivers, vehicles, and vehicle miles of travel (1961, 1966, 1974 to 1978). Also appended are the legislative background and authority of the 55 mph law, including PL 95-599, and a state-by-state summary of penalties for violation of the 55 mph speed limit.

National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590
1979 ; 52p refs
Availability: NHTSA

HS-805 019

ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT

Forty-two tires were subjected to nondestructive ultrasonic inspection. Of these, 10 were retreaded tires with measured belt edge separations of the tire shoulders; the remainder were 32 tire casings reported to be in good condition and ready for retreading. Ultrasonic data were analyzed and numerical scores from one (poor) to nine (excellent) were assigned tire tread, belts, sidewalls, and carcass. Tires were ranked in order of overall numerical scores. Of the 10 tires with belt edge separations, five had a belt score of 5 and four had a belt score of 7 or less. There was no unique correspondence between belt score and reported separation size, although three tires with low belt score (5) had reported separations of 5 or 7 mm, whereas only one tire with a higher belt score (6) had a separation of longer than 3 mm. Belt scores for the 32 casings were as follows: 3 for one casing; 4 for two casings; 5 for one casing; 6 for five casings; 7 for five casings; 8 for eight casings; and 9 for ten casings. Using the threshold score of 7 to separate defective casings from the remainder, 16 of the 32 tire casings were suspect.

by Stephen Bobo
Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142
Rept. No. DOT-TSC-NHTSA-79-47; PB80-130 503 ; 1979 ; 27p
Rept. for Jan-Sep 1979.
Availability: NTIS

HS-805 066

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION

The National Hwy. Traffic Safety Administration's (NHTSA) proposed plan for evaluating automatic restraint systems and Federal Motor Vehicle Safety Standard (FMVSS) 208 during the period 1980-1986 covers passenger cars equipped with automatic crash protection both prior to and after the standard's effective dates. The revised version of FMVSS 208 requires automatic crash protection for front seat occupants in full-sized automobiles beginning in model year 1982, in intermediate and compact cars in model year 1983, and in subcompacts in model year 1984. The evaluation is designed to measure the actual overall effectiveness of automatic restraints in reducing fatalities and injuries in highway crashes; to observe the operational characteristics of these restraints in actual use and their effectiveness in specific crash situations; to assess public acceptance and utilization of automatic restraints; to assess the industrial consequences of the standard; and to perform a cost analysis of the standard, including costs of manufacturing, repair, and replacement, as well as insurance savings. Background information is given on the evaluation plan for FMVSS 208, as well as the range of NHTSA activities related to implementation and enforcement of the standard and development of occupant protection systems. Thirty specific evaluation questions are examined in detail. A description is provided of each of 14 evaluation projects recommended for inclusion in the plan. The plan's four sections include prioritization of the 30 objectives, listing of projects (including completion milestones), a summary plan schedule for the projects, and a preliminary projection of resource requirements.

National Hwy. Traffic Safety Administration, Office of Prog. Evaluation, Washington, D.C. 20590
1979 ; 130p 15refs
Cover title: Evaluation Plan....
Availability: NHTSA

HS-805 172

ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME

University of Michigan, Hwy. Safety Res. Inst.
1979 ; 91p 326refs
Sponsored by National Hwy. Traffic Safety Administration. For abstract, see HS-803 714. See also HS-803 764.
Availability: GPO, stock no. 050-003-00376-0

HS-805 198

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS

This manual is intended to aid states in detecting stolen motor vehicles before they are "fenced" under the cloak of legitimate ownership documents. The vehicle theft problem and the relationship of the titling process to vehicle theft are summarized. Techniques common to commercial/professional vehicle theft operations for retitling stolen vehicles are described, including salvage switch, altered or stolen vehicle identification numbers, and fraudulent documents (counterfeit, altered, or stolen). Weaknesses in the generalized titling/registration process that are vulnerable to these techniques are identified for the areas of document intake and processing, vehicle processing for title/registration, and salvage vehicle and document processing. More general deficiencies that affect the overall titling/registration process are described related to document uniformity, title document security, and related laws. Policies and procedures are suggested for counteracting the procedural weaknesses. Appended are National Hwy. Traffic Safety Administration guidelines for state motor vehicle titling and anti-theft programs.

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
Ref: DOT-HS-6-01425
1980 ; 24p 8refs
Prepared in coordination with Federal Interagency Com. on Auto Theft Prevention. Based on HS-803 236, "Guidelines Manual: Vehicle Theft Countermeasures in the Issuance of Certificates of Vehicle Title."
Availability: NHTSA

HS-805 199

INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979

Following opening remarks and professional data on recipients of awards for contributions to automotive safety, status reports are presented on motor vehicle safety, by government and industry representatives from U.S., Japan, Italy, Federal Republic of Germany, U.K., and France, as well as special guest speaker presentations, and a panel discussion on the experimental safety vehicle program. Papers follow from six technical seminars: frontal crash protection and passive restraint development; biomechanics and dummy development; side impact protection; accident investigation and data analysis; pedestrian protection; and braking, handling, and stability. A panel discussion on rulemaking intentions of the U.S., European, and Japanese governments, and closing remarks are reported. Included is a list of participants grouped by country and subgrouped by affiliation, or under other categories (international organizations, press).

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 979p refs
Includes HS-028 398--HS-028 461. Conference sponsored by Government of France, hosted by French Automobile Manufacturers.
Availability: GPO

HS-805 216

PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT

The application of pedestrian protective front-end designs was studied using four candidate vehicles representing the 1979 passenger car fleet, the Dodge Omni, Ford Fairmont, Chevrolet Malibu, and Chevrolet Impala. The focus of the study was to analyze the cost and weight changes for a passenger car/pedestrian initial impact protection system, based on an engineering assessment using existing data. A protective system which did not meet Part 581 Standard requirements was compared to a system which met those requirements. When propagated weight changes (based on a 1.75 factor or a 1.5 factor) are considered for the pedestrian impact protective design not meeting the Part 581 Standard, the maximum weight increase per vehicle would be on the Dodge Omni and the greatest weight saving would be on the Chevrolet Impala. The total vehicle cost changes including that of the propagated weight based on a 1.75 factor range from an increase of $55.80 on the Ford Fairmont to $17.20 on the Chevrolet Impala. Based on a 1.5 factor, the cost range would be from an increase of $55.58 for a Ford Fairmont to an increase of $20.04 for a Chevrolet Impala. When the same propagated weight changes are considered for the pedestrian impact protective design that meets the Part 581 Standard, the maximum weight increase per vehicle would be on the Dodge Omni and the greatest weight saving would be on the Chevrolet Impala. The total vehicle cost changes including that of the propagated weight based on a 1.75 factor range from an increase of $76.69 on the Ford Fairmont to $40.99 on the Chevrolet Malibu. Based on a 1.5 factor, the cost range would be from an increase of $75.51 for a Ford Fairmont to an increase of $42.08 for a Chevrolet Malibu. A total leadtime of three model years would probably be required by the industry to meet a new Standard. A total industry investment of about $30 million would be required to provide the equipment and facilities for the front end system production.

by Robert McLean; Louis A. C. Barbarek; O. J. Viergutz
IIT Res. Inst., Transportation Div., 10 West 35th St., Chicago, Ill. 60616; De Lorean Motor Co.
DOT-HS-9-02112
1979 ; 117p 9refs
Availability: NTIS

HS-805 217

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT

A cooperative approach among states in Dept. of Transportation Region VIII (Colorado, Montana, Wyoming, South Dakota, North Dakota, and Utah) was investigated for conducting public information and education (PI and E) campaigns on occupant restraints. The concept of regional cooperation is discussed, and present occupant restraint programs in Region VIII states are briefly described. Although certain differences of opinion exist among the states concerning the efficiency of seat belt campaigns, there is general agreement that coordination of research and identification of critical markets are worthy of a regional cooperative approach. A framework for regional cooperation in PI and E is presented which addresses the issues of management, funding, and distribution of materials produced. The dominant theme of this recommended program is "Share the Risks and Share the Benefits." Appended are a two-year planning cycle for a safety campaign; a sample request for proposal (contractor support); and suggestions regarding a seat belt PI and E campaign, questions for group discussions or individual interviews concerning seat belts, and a series of campaigns aimed at intermediaries (e.g. police, parents, media). Attached are a National Hwy. Traffic Safety Administration memorandum concerning the pooling of 402 funds, and suggested procedures for joint-funding administration.

by George B. Berke
Logical Technical Services Corp., 311 Maple Ave. West, Vienna, Va. 22180
DOT-HS-9-02154
Rept. No. LTS-SB2-40-8(a)79-C-137 ; 1979 ; 64p refs
Rept. for May-Sep 1979.
Availability: NTIS

HS-805 219

EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT

A study was undertaken to develop an improved headlamp beam for use in conditions of oncoming or preceding traffic. After a review of the literature concerning headlighting and visual perception and consultations with lighting industry representatives, a number of candidate beam patterns were evaluated by two computer models. One model estimates the visibility distance provided to various areas under a variety of road conditions, while the other produces a "figure of merit" for each beam (i.e. percentage of time it simultaneously meets certain visibility and glare criteria). Based on this evaluation, three different beam patterns were selected for field testing (a similar pattern to the SAE low beam but with upgraded intensity, a beam with more light to the right of the road, and a beam with more light to the left of the road). Results of subjective and objective tests indicate that the best of the test lamps (upgraded SAE low beam) was only marginally better than the standard SAE low beam. The implication is that overall improvements in low-beam headlighting will not come easily.

by R. Halstead-Nussloch; P. L. Olson; W. T. Burgess; M. J. Flannagan; M. Sivak
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
DOT-HS-7-01554
Rept. No. UM-HSRI-79-91 ; 1979 ; 177p 61refs
Rept. for Dec 1976-Oct 1979.
Availability: NTIS

HS-805 220

PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT

Experimental data were obtained in dynamometer tests of a 6-cylinder spark ignition 1977 Ford 300 cu-in-displacement engine with a catalytic converter, exhaust gas recirculation, manifold preheated air inlet system, alternator (driven only, no output), and fan. The engine as equipped is intended for use in a 49-state (Federal) vehicle with automatic transmission. The testing was designed to obtain engine performance data for estimating fuel consumption and emissions (carbon monoxide, hydrocarbons, and nitrogen oxides) for varied engine service and duty, and to provide basic engine characteristic data required for the Transportation Systems Center Vehicle Simulator computer program. A test report and discussion of results are followed by tabular and graphical summaries of engine map data.

by Joseph Boziuk
Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142
PPA-HS027
Rept. No. DOT-TSC-NHTSA-80-9 ; 1980 ; 46p
Availability: NTIS

HS-805 224

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT

Energy-loss measurements were made on 12 passenger car tires under three different test conditions: with the tire in a straight, free-rolling condition; subjected to driving/braking torques based on the Federal Urban Driving Cycle (LA-4); and subjected to driving/braking torques based on the Federal Highway Fuel Economy Test (HFET). The tire sample, representative of current original equipment, ranged in size from a P155/80D13 to an HR78-15. It was found that energy-loss values for a given tire are, in general, the smallest for steady-state, free-rolling test conditions and the largest for LA-4 traction conditions. Relative ranking among tires with respect to energy-loss level appears to be relatively independent of the type of test cycle employed. Energy-loss levels measured under conditions of driving/braking traction are very sensitive to the magnitude and duration of the time rate of change of the applied wheel torque. Recommendations are made for future testing. A tabular summary of the LA-4 and HFET volocity-torque schedules, the General Motors tire performance criteria break-in procedure, and a description of Calspan's Tire Research Facility are appended.

by Leonard Bogdan
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DOT-TS-15361; DOT-TS-15581; PPA-HS027
Rept. No. DOT-TSC-NHTSA-80-13 ; 1980 ; 58p 3refs
Availability: NTIS

HS-805 228

AN ASSESSMENT OF STATE AND COMMUNITY HIGHWAY SAFETY PROGRAMS, FY 1975-FY 1979

Section 402 State and Community Highway Safety Grants Program costs and benefits are analyzed for fiscal years 1975-1979, with emphasis on the nine program areas which utilize 90%-95% of 402 funds. These program areas include planning and administration, driver education, driver licensing, alcohol safety, traffic records, emergency medical services (EMS), pedestrian safety, police traffic services, and school bus safety. Special attention is also given to those areas for which Congress authorized High Payoff Funds: control of the drinking driver, speed limit enforcement, EMS, and other areas aimed directly at reducing accident fatalities and injuries. It is concluded that the 402 program has made important contributions in reducing accidents, preventing fatalities and injuries, upgrading highway safety support systems, and that the program has made most modern highway safety practices available to all levels of state and local governments. These accomplishments have been made in spite of 1970's inflation, competing program requirements, and limited resources at all government levels.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1980 ; 88p refs
Availability: NHTSA

HS-805 229

MARIJUANA, OTHER DRUGS AND THEIR RELATION TO HIGHWAY SAFETY. A REPORT TO CONGRESS

Efforts are reported to detect and prevent marijuana and other drug use by motor vehicle operators. Similarities and differences between alcohol and drugs as related to highway safety are discussed, as are the frequency of drug use among drivers and its effect on highway safety, the legal approaches to the control of drug use by drivers, and Federal and state activity in detection and prevention of inappropriate drug use by drivers. Although methods of detecting drug presence in blood have improved over the past decade, detection of most drugs, including marijuana, in breath or saliva, is not possible now or in the near future. Only ten states have effective combinations of drug-and-driving laws. State traffic laws impeding effective law enforcement, and lack of data relating specific drug levels to driving impairment, limit the ability of law enforcement agencies to detect and prevent use of drugs by drivers. Although a series of studies is being sponsored by Federal agencies investigating drug effects, and some states have begun programs to collect pertinent data, much time and research will be required for a complete understanding of the problem. Except for alcohol, no drug has been established as a high priority highway safety concern. The frequency with which drug-impaired drivers drive, are arrested, or are involved in crashes is not known. Drugs which may impair driving include prescription and over-the-counter drugs as well as illicit drugs. Information on marijuana and driving is incomplete, and does not support arguments either for or against marijuana as a high priority highway safety concern. Extensive roadside surveys are needed to determine the nature and extent of drug use by drivers who are not involved in accidents or suspected of impaired driving. Revision of existing state laws is recommended to permit appropriate law enforcement, especially governing the use of chemical tests and definitions of driving under the influence of alcohol and/or drugs. An information and education program and continued research are recommended. The National Academy of Sciences will be requested to consider the feasibility of developing reliable chemical tests for drugs and of identifying drug concentration levels as valid indicators of driving impairment, as well as examining the use of the criminal law system as the primary countermeasure approach to the problem.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 55p 52refs
Availability: NHTSA

HS-805 231

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT

The 1979 Conference on Hwy. Safety Res., Devel., and Demonstration was held to review proposed activities to be undertaken by the National Hwy. Traffic Safety Administration over a five-year period, FY1980-FY1984. Program plans and recommendations reviewed include 55 mph noncompliance and other unsafe driving acts; occupant restraints; alcohol and drugs; pedestrian, bicyclist, and student transportation safety; driver licensing; motorcycle and moped safety; young drivers; Emergency Medical Services; state traffic records; state program management; traffic law adjudication; police traffic services; motor vehicle registration, titling, and antitheft; and the National Driver Register. In addition to specific program elements, issues are reviewed related to program priorities, the basis for their selection, the transfer of program results, and their responsiveness to the needs of the national highway safety community. More than 200 conference participants are listed with their affiliations.

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
DOT-HS-9-02113
Rept. No. UR-16 ; 1979 ; 133p
Conference held at Chantilly, Va., 22-26 Apr 1979.
Availability: NHTSA

HS-805 257

AIR BAG INFLATOR RELIABILITY

Air bag inflators used in production automobiles will be among the most reliable components in a car. The companies making them--Thiokol Chemical Corp., Talley Industries, and Rocket Research--have extensive aerospace experience and are aware of the need for exceptionally reliable performance. A typical air bag system is described, including the function of an inflator. The experience of more than 10,000 GM production cars on the road with air bags is outlined. The malfunctions of experimental "workhorse" inflators are not indicative of the reliability of production airbag systems because of differences in design and use. A comparison of the reliability of production air bag systems with that of other safety components in automobiles shows the air bags to be far more effective than seat belts, and more reliable than other auto safety components such as brakes, tires, and lights. The 10,281 GM cars with air bags sold from 1974-1976, in more than 600 million miles, recorded 189 deployment crashes with 378 air bags deployed, and experienced no fires, hot gas leaks or other inflator malfunctions, and no failure to deploy, for an estimated reliability of more than 99%.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1979 ; 21p
Availability: NHTSA

HS-805 258

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981

The impacts of the proposed fuel economy standards for mode years 1980 and 1981 light trucks and vans are analyzed, ove and above the standards set for model year 1979, and a level i assumed for vehicles not subject to the 1979 standard. Th assumptions used in this analysis are explained. A micro-assessment is given of the proposal's impact on individual manufacturers and consumers, followed by a macro-assessment of impact on energy consumption, employment, and the national economy. The various alternatives considered by the NHTSA in its final rulemaking are also discussed, including different levels of fuel economy, the inclusion or exclusion of captive imports, and alternatives in vehicle classification. A discussion of cost estimates is appended.

National Hwy. Traffic Safety Administration, Office of Program and Rulemaking Analysis
1978 ; 192p 3refs
Availability: NHTSA

HS-805 259

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER

Development of final fuel economy standards is described for pickups, vans and utility vehicles manufactured during model year (MY) 1981. These standards include an amendment to the MY 1981 fuel economy standards for 2-wheel vehicles issued in Mar 1978, and evolve from the Notice of Proposed Rulemaking (NPRM) issued in Dec 1978. The standards have been developed from information used in the Mar 1978 rulemaking, information supplied by the Chrysler Corp. and the other light truck manufacturers in response to a Jul 1978 questionnaire on light trucks, and subsequent Chrysler responses to agency inquiries, as well as information supplied by manufacturers of light trucks, by lubricant suppliers, and by other interested parties. Following a comparison of the 1977 and 1979 baselines, technology improvements are considered (engine improvements, alternative engines and turbochargers, transmissions, improved accessories, lubricants, rolling resistance, aerodynamic improvements, weight reduction, and reduction in engine size and axle ratio), with the current manufacturers' estimates of their capability and the agency's final position. Alternatives, imports and captive imports are discussed. The agency's decision in the determination of 1981 light truck fuel economy standards is explained. The impact of the action on the economy and the environment is considered, and a docket summary includes comments by automobile manufacturers, suppliers, businesses, citizen groups, trade associations, and private citizens.

National Hwy. Traffic Safety Administration, Office of Automotive Fuel Economy Standards
1979 ; 168p
Confidential material has been deleted. See also HS-805 260.
Availability: NHTSA

HS-805 260

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT

The development of final fuel economy standards for light trucks, vans, and utility vehicles for model years (MY) 1980 and 1981 is described. The standards apply to all light trucks (LT's) of 8500 lb gross vehicle weight rating and less with a curb weight of 6000 lb or less and a frontal area of 46 sq ft or less. Classification by number of driving wheels is proposed. The fuel economy requirements are 16.0 mpg in MY 1980 and 18.0 in MY 1981 for 4x2 LT's; 14.0 mpg in MY 1980 and 15.5 mpg in MY 1981 for 4x4 LT's; and 14.0 mpg in MY 1980 and 15.0 mpg in MY 1981 for LT's from manufacturers whose fleet of LT's uses basic engines that are not also used in passenger automobiles. Captive imports must meet the same fleet average requirements as for other 4x2 and 4x4 LT's. Background information on the standards is followed by discussions of technology improvements, alternative fuel economy levels and determination of maximum feasible fuel economy, economic impact and fuel savings, and impact on the environment. A docket summary outlines comments received by the National Hwy. Traffic Safety Administration on the rulemaking. Appended are results of a study of electronic engine control for improved fuel economy.

National Hwy. Traffic Safety Administration, Office of Automotive Fuel Economy Standards, Washington, D.C. 20590
1978 ; 400p refs
Confidential material has been deleted. See also HS-805 259
Availability: NHTSA

HS-805 261

POLICE TRAFFIC RADAR: IS IT RELIABLE?

Technical innovations in police traffic radar, especially the development of "moving radar," have caused the public and the courts to question the reliability and accuracy of modern traffic radar devices and the adequacy of police radar operator training. The National Hwy. Traffic Safety Administration has entered into an interagency agreement (DOT-HS-7-01697) with the National Bureau of Standards (NBS) to develop performance standards for police speed measuring devices, and is developing a model training program in use of these devices. Information is presented on a series of laboratory and field tests conducted by the NBS on police traffic radar equipment questioned in a Judicial Hearing in Dade County, Fla. The NBS researchers were especially concerned with the susceptibility of the radar devices to interference from Citizens Band and police radios, and police cars' ignition, alternator, and air-conditioner and heater fans. They also examined problems such as patrol speed shadowing, target speed bumping or batching, and possible errors due to panning, scanning, interpreting the cosine angle effect, and the automatic lock-on feature. It was concluded, from tests of the six devices identified in the Dade County hearing, that radar is a reliable tool when properly installed and operated by skilled and knowledgeable operators. It is recommended that uniform statewide standards, guidelines and procedures be established for: operator training and certification; equipment purchase, maintenance, testing and certification; operating practices; and periodic recertification of both equipment and operators.

National Hwy. Traffic Safety Administration
1980 ; 41p
Includes interim report, "Tests of Six Speed Measuring Radar Units," by Law Enforcement Standards Lab., National Bureau of Standards.
Availability: NHTSA

HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL

A manual is provided for the participant in a seminar directed toward increasing pre-sentence investigation (PSI) personnel's awareness of the necessity for, and importance of, identification of the level of alcohol abuse among the DWI (driving while intoxicated) offender population. The seminar focuses on an explanation of the Alcohol Safety Action Proj.'s health/legal approach to the DWI problem, particularly on screening procedures. The manual contains the seminar agenda, and information on each of the nine seminar units (introduction and overview, the problem drinking driver, alcohol and impairment, the responsibilities of PSI personnel, screening instruments, practical application, report writing, court-monitored rehabilitation programs, and summary). Appended are facts on alcohol use and abuse, and sample tests.

National Hwy. Traffic Safety Administration, Office of State Prog. Assistance, Washington, D.C. 20590
1980 ; 67p refs
Clearinghouse Training Materials. Subject: Pre-Sentence Investigation Techniques. Format: Participant's Manual. Type of Audience: Pre-Sentence Investigation Personnel. Education level: High School or College Graduate. See also HS-900 035.
Availability: NHTSA

HS-900 035

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE

An instructor's guide is provided for a seminar directed toward increasing pre-sentence investigation (PSI) personnel's awareness of the necessity for, and importance of, identification of the level of alcohol abuse among the DWI (driving while intoxicated) offender population. The seminar focuses on an explanation of the Alcohol Safety Action Proj.'s (ASAP) health/legal approach to the DWI problem, particularly on screening procedures. The guide provides an overview of the seminar, followed by guidelines for conducting each of nine units: introduction and overview, the problem drinking driver, alcohol and impairment, the responsibilities of PSI personnel, screening instruments, practical application, report writing, court-monitored rehabilitation programs, and summary. The guidelines for each unit consist of two parts: a summary page, indicating instructional methods and objectives, and references to be used; and the actual lesson plan. Appended are facts on alcohol abuse, and sample tests. The two-day seminar can be conducted by one person, assuming that his knowledge and capabilities cover all necessary areas, and he has access to local background information. The seminar is directed to persons with a 12th grade education (or higher), at least six months' experience as a court employee (paralegal or probation officer) or community agency employee, and high motivation to provide referral recommendations to the courts in DWI cases. Recommended class size is 12 to 15 persons. Two types of evaluation are used: pre- and post-seminar questionnaires, which measure the amount of new information gained by the participants; and a materials evaluation form, which assesses the participants' general impression of the training.

National Hwy. Traffic Safety Administration, Office of State Prog. Assistance, Washington, D.C. 20590
1980 ; 128p refs
Clearinghouse Training Materials: Subject: Presentence Investigation Techniques. Format: Instructor's Guide. Type of Audience: Pre-Sentence Investigation Personnel. Education level: High School or College Graduate. See also HS-900 034.
Availability: NHTSA; tape from NHTSA, Traffic Safety Programs

HS-900 038

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.

A cassett tape/workbook training module concerning the administrative evaluation of State Highway Safety Programs is provided. This module was designed to provide new personnel, hired by a State Highway Safety Office, with an introduction to the magnitude of the highway safety program. The module will be of value to long-term employees as well, and to all persons concerned with highway safety within the U.S. The seven sections of this self-instruction module are as follows: introduction, concepts and purposes of administrative evaluation, administrative evaluation planning, administrative evaluation reporting, summary of module, glossary and appendices (Title 23, U.S. Code, Section 402; guidelines for writing objectives).

National Hwy. Traffic Safety Administration, Manpower Devel. Div., 400 7th St., S.W., Washington, D.C. 20590
1979 ; 85p refs
Clearinghouse Training Materials. Subject: State Highway Safety Program Administrative Evaluation. Format: Workbook. Cassett tape. Type of Audience: State Highway Safety Program Personnel.
Availability: NHTSA

INDEX to ABSTRACTS

blank page

KWOC Title Index

ACCEPTABILITY
IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER HS-027 404

ACUTE
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE HS-028 487

ADMINISTRATIVE
HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED. HS-900 038

ADVISORY
THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE HS-028 479

AERODYNAMIC
SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG HS-027 341

AFTERMARKET
A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS HS-028 499

AFUP
PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP) HS-027 372

AGRICULTURE
AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM HS-027 379

AIR
AIR BAG INFLATOR RELIABILITY HS-805 257

HYDRO-AIR BRAKE SYSTEM HS-028 448

ALCOHOL
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES HS-028 463

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000 HS-027 371

ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME HS-805 172

AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN HS-028 498

MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM? HS-028 497

YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES HS-028 480

ALIVE
55 ALIVE/MATURE DRIVING HS-028 483

AMERICAN
AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979 HS-028 462

ANALYTICAL
ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS HS-028 495

ANGLES
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS HS-028 500

ANTHROPOMORPHIC
EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES HS-028 418

ARTICULATED
AM GENERAL/M.A.N. ARTICULATED BUS HS-027 346

ASSESSING
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS" HS-027 380

ASSESSMENT
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT HS-028 468

AN ASSESSMENT OF STATE AND COMMUNITY HIGHWAY SAFETY PROGRAMS, FY 1975-FY 1979 HS-805 228

ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS HS-027 405

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT HS-027 375

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981 HS-805 258

ASSOCIATION

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

ASSURE

AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM
HS-027 379

ATTEMPT

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

ATTITUDE

YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES
HS-028 480

AUSTRALIA

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

AUTOMATIC

AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE
HS-027 399

AUTOMOBILE

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

OUR UNEXAMINED AUTOMOBILE CULTURE
HS-027 397

AUTOMOBILES

PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)
HS-027 340

AUTOMOTIVE

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

AVAILABILITY

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

AVAILABLE

A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

AVOIDANCE

AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

AXISYMMETRIC

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

BAG

AIR BAG INFLATOR RELIABILITY
HS-805 257

BASE

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

BAY

SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

BEAM

EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

BEHAVIOR

A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434

BEHAVIOUR

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

BELT

A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER
HS-027 404

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

SEAT BELT LEGISLATION
HS-028 464

SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

BELTS

A SAFETY SEAT WITH INCORPORATED BELTS. STUDY
HS-028 398

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

BENEFIT

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

BENEFITS

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

BETA

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

BIASES

SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

BICYCLE

A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

BIOMECHANICAL

THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

BLOCKING

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

BOARD

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

BODY

A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

BONNET

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

BOOK

55 MPH FACT BOOK. 4TH ED.
HS-804 979

BRAKE

AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

HYDRO-AIR BRAKE SYSTEM
HS-028 448

BRAKED

IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

BRAKING

AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

INTEGRAL OR COMBINED BRAKING SYSTEM FOR MOTORCYCLES
HS-028 446

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING
HS-028 459

BREATH

ALL LIT UP: ELECTRONIC BREATH TESTERS SOON
HS-027 339

BROKERAGE

COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

BUS

AM GENERAL/M.A.N. ARTICULATED BUS
HS-027 346

IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

BUSINESS

REGULATING CHRYSLER OUT OF BUSINESS?
HS-027 389

CADILLAC

DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

CALIFORNIA

COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

CALSPAN

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

CANADIAN

WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

CAR

CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE
HS-027 399

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

IDEAL POLICE CAR, 1978 TECHNICAL REPORT, 2ND ED.
HS-027 342

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE ROLLING AND BRAKING/TRACTION MODES FINAL REPORT
HS-805 224

SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING
HS-028 459

CARBON

DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

CARDIOVASCULAR

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

CAROLINA

EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

CARS

A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS
HS-028 406

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS
HS-028 460

PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)
HS-027 340

SAFER CARS FOR PEDESTRIANS
HS-028 443

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

CASE

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

CASINGS

ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

CASUALTIES

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

CATALYST

CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS
HS-027 348

CHAMBER
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE HS-027 355

CHARACTERISTICS
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES HS-027 345
COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS HS-028 433
DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION HS-028 454
MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE HS-028 402
PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT HS-805 220
VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS HS-028 453

CHARGE
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE HS-027 355

CHECKING
CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE HS-027 399

CHILD
EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA HS-028 471
PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS HS-028 466
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT HS-028 467
WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES HS-028 485

CHILDREN
CHILDREN KILLED IN CRASHES HS-028 491

CHOKE
CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE HS-027 399

CHRYSLER
REGULATING CHRYSLER OUT OF BUSINESS? HS-027 389

CID
PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT HS-805 220

CITIES
WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES HS-028 485

CITYBUS
IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY HS-027 347

CLASSIFIED
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS HS-027 382

CLEAN
AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM HS-027 379

CLEANLINESS
HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS HS-027 378
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS" HS-027 380

COLLISION
ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS HS-028 495
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION HS-028 481
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM) HS-028 449
COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS HS-028 433
LATERAL COLLISION TESTS HS-028 423
MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE HS-028 400
SIDE COLLISION HS-028 422

COLLISIONS
ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECON-

STRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

COLUMNS
DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION
HS-028 410

COMBUSTION
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

COMFORTABLE
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

COMMERCIAL
IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

COMMUNICATIONS
A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

COMMUNITY
AN ASSESSMENT OF STATE AND COMMUNIT
HIGHWAY SAFETY PROGRAMS, FY 1975-FY 1979
HS-805

COMMUNITY BROKERAGE OF TRANSPORTATI
SERVICES FOR THE ELDERLY IN MOUNTA
VIEW, CALIFORNIA. FINAL REPORT
HS-027 4

COMPARATIVE
A COMPARATIVE ANALYSIS OF FACTORS IMPAC
ING ON SEAT BELT USE
HS-027 4

RESULTS OF COMPARATIVE FRONTAL CRAS
TESTS
HS-028 4

COMPARISON
A COMPARISON OF ALCOHOL INVOLVEMENT
PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 4

A COMPARISON OF PROJECTED ELECTRIC UTIL
ITY PEAKING GAS TURBINE ENERGY REQUIRE
MENTS TO POTENTIAL ALCOHOL FUELS AVAIL
ABILITY: 1980-2000
HS-027 37

COMPATIBILITY
A CONCEPT OF INCREASING COMPATIBILITY O
PASSENGER CARS
HS-028 40

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 43

COMPONENT
HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 37

COMPONENTS
MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 39

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

COMPUTERS
SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

CONCEPT
A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS
HS-028 406

CONCEPTS
CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS
HS-027 348

CONFERENCE
AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT
HS-805 231

INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979
HS-805 199

CONFIGURATIONS

A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

CONGRESS

MARIJUANA, OTHER DRUGS AND THEIR RELATION TO HIGHWAY SAFETY. A REPORT TO CONGRESS
HS-805 229

STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

CONSERVATION

A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES
HS-027 349

CONSPICUITY

CONSPICUITY OF MOTORCYCLES
HS-027 387

CONSTRUCTION

A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

CONTAMINANTS

THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

CONTAMINATION

TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS
HS-027 376

CONTROL

A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434

ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

COOPERATION

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

CORNERING

ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

CORRELATION

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

COUNTER

PARTICLE COUNTER PHYSICS
HS-027 381

COUNTERMEASURE

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

COURSE

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

MOTORCYCLE RIDER COURSE FEASIBILITY STUDY
HS-028 486

COURT

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

COVER

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING
HS-028 459

CRASH

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY
HS-804 188

RESULTS OF COMPARATIVE FRONTAL CRASH TESTS
HS-028 404

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

CRASHES

CHILDREN KILLED IN CRASHES
HS-028 491

CRITERIA

PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS
HS-028 414

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

CRUSH

MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

CUBIC

PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

CULTURE

OUR UNEXAMINED AUTOMOBILE CULTURE
HS-027 397

CYCLE

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

CYLINDER

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

DAMAGE

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

DEAF

FALLING ON DEAF EARS? (NOISE REGULATIONS)
HS-027 344

DEFINED

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

DEFINITION

DEFINITION OF THE VEHICLE DYNAMIC CHARA
TERISTICS BY THE TRANSFER FUNCTION: CORR
LATION WITH SUBJECTIVE EVALUATION
HS-028 45

DEGREE

THE DEGREE OF BENEFIT OF BELTS IN REDUC
ING INJURY--AN ATTEMPT TO EXPLAIN STUD
DISCREPANCIES
HS-027 40

DEMAND

FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

DEMONSTRATION

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT
HS-805 231

DESCRIBING

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

DESIGN

A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION
HS-028 410

DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION
HS-027 390

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION
HS-028 442

DETECTORS
A STANDARD FOR VEHICLE DETECTORS. TENTATIVE REVISED STANDARD
HS-027 392

DEVICE
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

DEVICES
EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

DIAGONAL
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

DIAZEPAM
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

DIMENSIONAL
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

DIRECTION
STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

DISCREPANCIES
THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

DISPERSION
DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

DISPLACEMENT
PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

DOCUMENT
PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

DOSE
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

DOWNSIZING
VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE
HS-028 492

DRAG
SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

DRINKING
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

DRIVE
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION
HS-028 481

DRIVER
A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434

ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

INDICATORS OF DRIVER INATTENTION
HS-028 472

POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

DRIVERS
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION
HS-028 481

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

THE PHYSICIAN'S RESPONSIBILITY FOR EPILEPTIC DRIVERS
HS-027 412

DRIVING

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES
HS-028 480

55 ALIVE/MATURE DRIVING
HS-028 483

DRUG

AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

DRUGS

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

MARIJUANA, OTHER DRUGS AND THEIR RELATION TO HIGHWAY SAFETY. A REPORT TO CONGRESS
HS-805 229

DUAL

A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

DUMMY

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

CONSIDERATIONS IN SIDE IMPACT DUMMY DEVELOPMENT
HS-028 415

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

DYNAMIC

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

DYNAMICS

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

EARS

FALLING ON DEAF EARS? (NOISE REGULATIONS)
HS-027 344

ECONOMY

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

FUEL ECONOMY MODELS (FUEL AND FUEL6)
HS-027 373

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

EDUCATION

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

EFFICIENCY

INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

ELDERLY

COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S
HS-027 396

ELDORADO

DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

ELECTRIC

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

ELECTRONIC

ALL LIT UP: ELECTRONIC BREATH TESTERS SOON
HS-027 339

ELIMINATING

ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

EMISSIONS

THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

EMPHASIS

CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS
HS-027 348

ENERGY

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES
HS-027 349

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

ENGINE

A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

ENGINEERING

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

ENGINEERS

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

ENGINES

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

ENVIRONMENT

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

ENVIRONMENTAL

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

EPILEPTIC

THE PHYSICIAN'S RESPONSIBILITY FOR EPILEPTIC DRIVERS

HS-027 412

EQUIPMENT

AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM

HS-027 379

ESV

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA

HS-028 429

ETUDE

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)

HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)

HS-028 439

EVALUATION

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION

HS-028 454

EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT

HS-805 219

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.

HS-900 038

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION

HS-805 066

PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT

HS-805 216

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION

HS-028 420

SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS

HS-027 403

EVERYTHING

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING

HS-028 459

EXCHANGE

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE

HS-027 357

EXCUSE

WHAT'S YOUR EXCUSE?

HS-027 38

EXHAUST

A STUDY OF THERMAL ENERGY CONSERVATIO IN EXHAUST PIPES

HS-027 34

EXPERIMENTAL ANALYSIS ON EXHAUST GA TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES

HS-027 35

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE

HS-027 351

EXPERIMENTAL

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES

HS-027 350

EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES

HS-028 418

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS

HS-028 438

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY

HS-027 347

INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979

HS-805 199

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)

HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)

HS-028 439

PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)

HS-028 441

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA

HS-028 429

EXPLAIN

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES

HS-027 406

EXPLORATORY
THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

EXPOSURE
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION
HS-028 481

FACEFORM
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

FACIAL
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

FACING
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

FALLING
FALLING ON DEAF EARS? (NOISE REGULATIONS)
HS-027 344

FATAL
FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

FATALITY
THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

FEASIBILITY
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

MOTORCYCLE RIDER COURSE FEASIBILITY STUDY
HS-028 486

FEDERAL
NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

FERROGRAPHIC
FERROGRAPHIC ANALYSIS FOR HYDRAULIC FLUIDS
HS-027 384

FILLED
MOTORCYCLE ACCIDENT DATA--A VOID TO BE FILLED
HS-028 490

FITTING
FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

FLOWS
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

FLUID
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

FLUIDS
FERROGRAPHIC ANALYSIS FOR HYDRAULIC FLUIDS
HS-027 384

FORD
PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

FORKLIFTS
FORKLIFTS: TINY TRUCKS, BIG HAZARDS
HS-027 386

FRANCISCO
SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

FREE
RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

FRONT
IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

FRONTAL

A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS HS-028 499

IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT HS-028 403

OCCUPANT PROTECTION IN FRONTAL IMPACTS HS-028 409

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS HS-028 417

RESULTS OF COMPARATIVE FRONTAL CRASH TESTS HS-028 404

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT) HS-028 408

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS HS-028 405

FUEL

FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND HS-027 374

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981 HS-805 258

FUEL ECONOMY MODELS (FUEL AND FUEL6) HS-027 373

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY HS-027 347

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER HS-805 259

THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT HS-027 401

FUELS

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000 HS-027 371

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP) HS-027 372

FUNCTION

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION HS-028 454

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS HS-028 413

FUNCTIONS

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV) HS-028 450

FUNDAMENTAL

A FUNDAMENTAL LOOK AT SIDE IMPACT HS-028 494

GALLONS

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS HS-027 343

GAS

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000 HS-027 371

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES HS-027 350

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE HS-027 357

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS HS-027 343

GASOLINE

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES HS-027 350

GUIDE

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE HS-900 035

GUIDELINES

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS HS-805 198

HANDICAPPED

SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT HS-027 411

TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S HS-027 396

HANDLING

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING HS-028 459

HARDWARE

VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE
HS-028 492

HAZARD

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

HAZARDS

FORKLIFTS: TINY TRUCKS, BIG HAZARDS
HS-027 386

HEAD

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

HEADLIGHTING

EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

HEAT

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

HELPS

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS
HS-027 343

HIGHWAY

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME
HS-805 172

AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

AN ASSESSMENT OF STATE AND COMMUNITY HIGHWAY SAFETY PROGRAMS, FY 1975-FY 1979
HS-805 228

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT
HS-805 231

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

MARIJUANA, OTHER DRUGS AND THEIR RELATION TO HIGHWAY SAFETY. A REPORT TO CONGRESS
HS-805 229

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)
HS-028 501

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

HISTORY

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

HOOD

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

HOSPITAL

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

HOURS

INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

HUMAN

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

HYBRID

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

HYDRAGAS

HYDRAGAS SUSPENSION
HS-027 358

HYDRAULIC

AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM
HS-027 379

FERROGRAPHIC ANALYSIS FOR HYDRAULIC FLUIDS
HS-027 384

HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 378

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS
HS-027 376

HYDRO

HYDRO-AIR BRAKE SYSTEM
HS-028 448

IGNITION

A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

IMPACT

A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

CONSIDERATIONS IN SIDE IMPACT DUMMY DEVELOPMENT
HS-028 415

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT
HS-028 403

IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT
HS-028 426

PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

IMPACTING

A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

IMPACTS

A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

OCCUPANT PROTECTION IN FRONTAL IMPACTS
HS-028 409

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

IMPROVE

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

IMPROVEMENT

A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT
HS-028 426

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

IMPROVING

IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER
HS-027 404

IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

INACCURACIES

THE INACCURACIES OF POLICE RADAR: OVERDRIVE'S REPORT
HS-027 400

INATTENTION

INDICATORS OF DRIVER INATTENTION
HS-028 472

INCH

PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

INCORPORATED

A SAFETY SEAT WITH INCORPORATED BELTS. STUDY
HS-028 398

INCREASE

IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

INCREASING

A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS
HS-028 406

INDEPENDENT

DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

INDICATORS

INDICATORS OF DRIVER INATTENTION
HS-028 472

INDIRECT

INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS
HS-028 460

INDUCED

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

INFANT

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

INFLATABLE

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

INFLATOR

AIR BAG INFLATOR RELIABILITY
HS-805 257

INFORMATION

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

INJURIES

COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS
HS-028 433

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

INJURY

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

INSPECTION
ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

INSTABILITY
ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

INSTRUCTION
HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

INSTRUCTOR
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

INSTRUMENTATION
EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

INTEGRAL
INTEGRAL OR COMBINED BRAKING SYSTEM FOR MOTORCYCLES
HS-028 446

INTERIM
THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

INTERIOR
INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN
HS-027 352

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

INTERNAL
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

INTERNATIONAL
INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979
HS-805 199

INTERVENTION
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

INVESTIGATION
ACCIDENT INVESTIGATION TECHNIQUES FOR SECONDARY SAFETY
HS-028 430

ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION
HS-028 432

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

INVESTIGATIONS
A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434

INVOLVEMENT
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

KENTUCKY
AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

KILLED
CHILDREN KILLED IN CRASHES
HS-028 491

KINEMATICS
PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

KNOWLEDGE
ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME
HS-805 172

LAMINAR
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

LAMP

AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

LATE

TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S
HS-027 396

LATERAL

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

LATERAL COLLISION TESTS
HS-028 423

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTÉCTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

LEGISLATION

IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

SEAT BELT LEGISLATION
HS-028 464

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING
HS-028 459

LEGISLATIVE

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

LICENSING

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

LIFE

INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

LIGHT

AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

LIGHTING

IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

LIMIT

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

LIMITS

THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

LITER

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

LOAD

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

LOCATION

MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES
HS-027 383

LOOK

A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

LOOP

POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

LOSS

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

LOUISVILLE

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

LOW

DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

LUBRICATION

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

MAJOR

WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

MANUAL

A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS
HS-805 198

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

MANUFACTURER

AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM
HS-027 379

MANUFACTURERS

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

MARIJUANA

MARIJUANA, OTHER DRUGS AND THEIR RELATION TO HIGHWAY SAFETY. A REPORT TO CONGRESS
HS-805 229

MARKET

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

MASSES

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

MATCHING

MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

MATHEMATICAL

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

MATURE

55 ALIVE/MATURE DRIVING
HS-028 483

MEASUREMENT

SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

MEASUREMENTS

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

MEASURES

YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES
HS-028 480

MEDICAL

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

MEDICINE

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

METERING

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS
HS-027 343

METHODS

ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 378

MICHIGAN

AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

MILLION

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS
HS-027 343

MINIMIZATION

CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

MITIGATION

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

MODEL

A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

SAFETY SYSTEMS OPTIMIZATION MODEL
HS-028 399

MODELING

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

MODELS

FUEL ECONOMY MODELS (FUEL AND FUEL6)
HS-027 373

STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)
HS-028 501

MODES

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

MODIFY

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

MODULE

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

MONOXIDE

DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

MONTHS

FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

MOTOR

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS
HS-805 198

IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE
HS-028 461

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

MOTORCYCLE

AN ON-THE-SPOT STUDY OF MOTORCYCLE ACCIDENTS IN NIGERIA
HS-028 482

MOTORCYCLE ACCIDENT DATA--A VOID TO BE FILLED
HS-028 490

MOTORCYCLE RIDER COURSE FEASIBILITY STUDY
HS-028 486

MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM?
HS-028 497

MOTORCYCLES

CONSPICUITY OF MOTORCYCLES
HS-027 387

INTEGRAL OR COMBINED BRAKING SYSTEM FOR MOTORCYCLES
HS-028 446

MOTORED

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

MOUNTAIN

COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

MOVE

PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)
HS-027 340

MPG

SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

MPH

55 MPH FACT BOOK. 4TH ED.
HS-804 979

MULTI

DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION
HS-027 390

MULTIPLE

MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES
HS-027 383

MVMA

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

NATIONAL

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY
HS-804 188

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

NHTSA

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

NIGERIA

AN ON-THE-SPOT STUDY OF MOTORCYCLE ACCIDENTS IN NIGERIA
HS-028 482

NOISE

FALLING ON DEAF EARS? (NOISE REGULATIONS)
HS-027 344

INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN
HS-027 352

NONPENETRATING

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

NOVEL

CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS
HS-027 348

NUMERICAL

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

OBTAINED

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

OCCUPANT

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

OCCUPANT PROTECTION IN FRONTAL IMPACTS
HS-028 409

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

OCCUPANTS
PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS HS-028 414
UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS HS-028 405

OFFENSES
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL HS-900 034
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE HS-900 035

ONTARIO
SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO HS-028 484

OPTIMIZATION
DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION HS-027 390
SAFETY SYSTEMS OPTIMIZATION MODEL HS-028 399

OPTIMUM
AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT) HS-028 457
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS HS-028 500

ORIGIN
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT HS-028 467

OVERALL
INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE HS-027 377

OVERDRIVE
THE INACCURACIES OF POLICE RADAR: OVERDRIVE'S REPORT HS-027 400

OVERVIEW
TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S HS-027 396

PAPER
LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT HS-805 260
LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER HS-805 259

PARAMETER
DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION HS-027 390

PARIS
INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979 HS-805 199

PART
PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS HS-028 417

PARTICIPANT
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL HS-900 034

PARTICLE
PARTICLE COUNTER PHYSICS HS-027 381

PASSENGER
A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS HS-028 406
INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS HS-028 460
MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE HS-028 400
PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT HS-805 216
REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION HS-028 420
RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT HS-805 224
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT HS-028 467

PASSIVE
DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION HS-028 410
DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS HS-028 401
PASSIVE PROTECTION: PROMULGATION OR POLITICS HS-028 474

PATH
A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT HS-027 409

PATTERNS

PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

PAVEMENTS

A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

PEAKING

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

PEDESTRIAN

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION
HS-028 432

CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD
HS-028 445

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION
HS-028 442

PEDESTRIANS

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS
HS-028 433

PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS
HS-028 414

SAFER CARS FOR PEDESTRIANS
HS-028 443

PEDIATRIC

EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

PEOPLE

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

PERFORMANCE

A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS
HS-028 401

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

PERSONS

SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

PERSPECTIVE
U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE
HS-028 461

PEUGEOT
PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

PHYSICIAN
THE PHYSICIAN'S RESPONSIBILITY FOR EPILEPTIC DRIVERS
HS-027 412

PHYSICS
PARTICLE COUNTER PHYSICS
HS-027 381

PIPES
A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES
HS-027 349

PLAN
A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

PLANNING
PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

PLANS
A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

PLASTICS
PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)
HS-027 340

POLICE
IDEAL POLICE CAR, 1978 TECHNICAL REPORT, 2ND ED.
HS-027 342

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 261

THE INACCURACIES OF POLICE RADAR: OVERDRIVE'S REPORT
HS-027 400

POLICY
STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)
HS-028 501

POLITICS
PASSIVE PROTECTION: PROMULGATION OR POLITICS
HS-028 474

PORT
HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

POSSIBILITIES
POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

POWER
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

PRACTICAL
A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

PRACTICE
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

PRACTICES
MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

PREDICTION
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

PRELIMINARY
A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY
HS-804 188

PREPARATION
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

PRESENTATION

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

PROBLEM

MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM?
HS-028 497

PROCEDURES

IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT
HS-028 403

IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

PROCEEDINGS

AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT
HS-805 231

PROCESS

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

PROCESSES

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

PRODUCTION

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

PROFESSIONAL

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

PROFILES

PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

PROJECT

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

PROJECTED

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

PROMOTE

STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

PROMULGATION

PASSIVE PROTECTION: PROMULGATION OR POLITICS
HS-028 474

PROPULSION

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

PROTECTION

A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT
HS-028 426

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

OCCUPANT PROTECTION IN FRONTAL IMPACTS
HS-028 409

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

PASSIVE PROTECTION: PROMULGATION OR POLITICS
HS-028 474

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS
HS-028 414

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION
HS-028 442

PROTECTIVE

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

PROTOTYPE

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

PUBLIC

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

PUBLICITY

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

PUMP

INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

QUALITY

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

RADAR

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 261

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

THE INACCURACIES OF POLICE RADAR: OVERDRIVE'S REPORT
HS-027 400

RADIOACTIVE

MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES
HS-027 383

RAMP

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS
HS-027 343

RATES

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

REALISTIC

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

REALIZED

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

REAR

A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

REARWARD

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

RECEPTOR

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

RECIPROCATING

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

RECLINING

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

RECOMMENDATIONS

ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

RECOMMENDED

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

RECONSTRUCTION

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

RECREATIONAL

INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN
HS-027 352

REDESIGN

SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

REDUCING

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

REDUCTION

INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN
HS-027 352

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

REGIONAL

A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

REGULATING

REGULATING CHRYSLER OUT OF BUSINESS?
HS-027 389

REGULATIONS

FALLING ON DEAF EARS? (NOISE REGULATIONS)
HS-027 344

RELATIONSHIPS

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

RELIABILITY

AIR BAG INFLATOR RELIABILITY
HS-805 257

RELIABLE

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 261

RENAULT

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

REPAIRING

CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE
HS-027 399

REQUIREMENT

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

REQUIREMENTS

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS
HS-028 460

RESEARCH

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT
HS-805 231

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

RESIDUAL
RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

RESPONSE
VEHICLE RESPONSE TO STOCHASTIC ROADWAYS
HS-027 391

RESPONSIBILITY
THE PHYSICIAN'S RESPONSIBILITY FOR EPILEPTIC DRIVERS
HS-027 412

RESTRAINT
DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION
HS-028 410

DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS
HS-028 401

EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

RESTRAINTS
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

RESULTING
RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

RESULTS
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 378

RESULTS OF COMPARATIVE FRONTAL CRASH TESTS
HS-028 404

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

RETRACTORS
SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

RETREADED
ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

REVIEW
ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME
HS-805 172

REVISED
A STANDARD FOR VEHICLE DETECTORS. TENTATIVE REVISED STANDARD
HS-027 392

RIDER
MOTORCYCLE RIDER COURSE FEASIBILITY STUDY
HS-028 486

RIDERS
MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM?
HS-028 497

RISK
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION
HS-028 481

ROAD
ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION
HS-028 432

ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

ROADSIDE
PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE
HS-028 492

ROADWAYS
DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

VEHICLE RESPONSE TO STOCHASTIC ROADWAYS
HS-027 391

ROLLING
RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

ROUTE
OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E.

(ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

RSV

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

RULEMAKING

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

SAE

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

SAFER

REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

SAFER CARS FOR PEDESTRIANS
HS-028 443

SAMPLING

SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

SASKATCHEWAN

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

SAVE

RAMP METERING HELPS SAVE 4.5 MILLION GALLONS OF GAS
HS-027 343

SCHOOL

IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

SEALS

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

SEAT

A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

A SAFETY SEAT WITH INCORPORATED BELTS. STUDY
HS-028 398

A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

SEAT BELT LEGISLATION
HS-028 464

THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

SEATBELT

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

SECONDARY

ACCIDENT INVESTIGATION TECHNIQUES FOR SECONDARY SAFETY
HS-028 430

SECTION

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

SECTOR

DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

SELECTION

SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

SELF

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

SEMITRAILERS
ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

SENSING
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

SENSORS
MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

SENTENCE
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

SERVICES
COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

SEVERITY
FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY
HS-804 188

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

SHAPED
THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

SIDE
A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

CONSIDERATIONS IN SIDE IMPACT DUMMY DEVELOPMENT
HS-028 415

IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT
HS-028 426

PRESENTATION OF A RONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

SIDE COLLISION
HS-028 422

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

SIGNIFICANCE
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

SIMPLIFIED
DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

SIMULATION
ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

SIMULATIONS
EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

SINGLE
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

SKILLS
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

SLASHING
SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

SMAC

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

SOCIETY

STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

SOON

ALL LIT UP: ELECTRONIC BREATH TESTERS SOON
HS-027 339

SPARK

A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

SPEED

SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

SPEEDS

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

SPINE

A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

SPOT

AN ON-THE-SPOT STUDY OF MOTORCYCLE ACCIDENTS IN NIGERIA
HS-028 482

STABILITY

IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

STAGED

ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

STANDARD

A STANDARD FOR VEHICLE DETECTORS. TENTATIVE REVISED STANDARD
HS-027 392

CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD
HS-028 445

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

STANDARDS

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

STATISTICAL

STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)
HS-028 501

STEERING

A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION
HS-028 410

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

STEM

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

STOCHASTIC
VEHICLE RESPONSE TO STOCHASTIC ROADWAYS HS-027 391

STOP
AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT) HS-028 457

STRAIGHT
HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE HS-027 351

STRATEGIES
A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT HS-805 217

STRATIFIED
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE HS-027 355

STRENGTH
A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS HS-028 407

STRONGER
STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS HS-027 388

STRUCTURES
COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS HS-028 435

SUBJECTIVE
DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION HS-028 454

SUBSIDIZED
SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT HS-027 411

SUBTLE
YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES HS-028 480

SUCCESSFUL
FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE HS-027 395

SUPPLEMENT
LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT HS-805 260

SUPPLY
DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY HS-028 431

SUPPORT
LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER HS-805 259

SURROGATE
A NEW DESIGN FOR A SURROGATE SPINE HS-028 419

SUSPENSION
DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO HS-027 359

DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION HS-027 390

HYDRAGAS SUSPENSION HS-027 358

SYNTHESIS
A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION HS-028 437

DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION HS-027 390

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS HS-028 412

TAXI
SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT HS-027 411

TELEVISION
THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR HS-027 394

TEMPERATURE
EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES HS-027 350

THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT HS-027 401

TENNESSEE
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT HS-028 467

TENTATIVE

A STANDARD FOR VEHICLE DETECTORS. TENTATIVE REVISED STANDARD
HS-027 392

TEST

A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT
HS-028 403

IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

TESTERS

ALL LIT UP: ELECTRONIC BREATH TESTERS SOON
HS-027 339

TESTING

HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 378

TESTS

DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

LATERAL COLLISION TESTS
HS-028 423

RESULTS OF COMPARATIVE FRONTAL CRASH TESTS
HS-028 404

TEXAS

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

THEFT

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS
HS-805 198

THEORETICAL

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

THERMAL

A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES
HS-027 349

THIRTY

ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

THORACIC

EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

TINY

FORKLIFTS: TINY TRUCKS, BIG HAZARDS
HS-027 386

TIRES

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

TITLING

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS
HS-805 198

TOLERANCES

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

TOPICS

TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS
HS-027 376

TOY

PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)
HS-027 340

TRACTION

RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

TRACTOR

ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

TRAFFIC

ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION
HS-028 432

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 261

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

TRANSFER

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

TRANSPORT

TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S
HS-027 396

TRANSPORTATION

COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

TRAUMA

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

TRUCK

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

TRUCKS

FORKLIFTS: TINY TRUCKS, BIG HAZARDS
HS-027 386

TURBINE

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

TURBOCHARGING

TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

TURBULENT

NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

ULTRASONIC

ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

UNDERRIDE

A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

UNEXAMINED

OUR UNEXAMINED AUTOMOBILE CULTURE
HS-027 397

UPGRADE

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

UPGRADED

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

UPGRADING

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

URBAN

STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

USAGE

ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

USAGERS

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

USEAGE

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

UTILITY

A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

UTILIZATION

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

VALVE

A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

VAN

FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN
HS-027 352

LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

VARIATION

THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

VEHICLE

A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS
HS-805 198

A STANDARD FOR VEHICLE DETECTORS. TENTATIVE REVISED STANDARD
HS-027 392

ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION
HS-027 390

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS
HS-027 393

NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA HS-028 429

THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS HS-028 427

U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE HS-028 461

UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS HS-028 405

VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS HS-028 453

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION HS-028 442

VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE HS-028 492

VEHICLE RESPONSE TO STOCHASTIC ROADWAYS HS-027 391

VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING HS-028 459

VEHICLES

IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES HS-028 456

INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979 HS-805 199

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES) HS-028 439

VISIBILITY

AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT) HS-028 457

INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS HS-028 460

VLS

PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE) HS-028 441

VOID

MOTORCYCLE ACCIDENT DATA--A VOID TO BE FILLED HS-028 490

VOLUME

ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME HS-805 172

VW

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS HS-028 438

WEAR

MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES HS-027 383

WEARING

FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE HS-027 395

THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR HS-027 394

WHEEL

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT HS-028 465

WHEELS

A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS HS-028 499

WIND

DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS HS-027 338

WORKBOOK

HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED. HS-900 038

YAW

ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING HS-027 402

YOUTH

YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES HS-028 480

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Author Index

Anderson, Daniel P.
FERROGRAPHIC ANALYSIS FOR HYDRAULIC FLUIDS
HS-027 384

Anderson, Theodore E.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

Appel, Hermann
PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS
HS-028 414

Apps, Gilbert E.
AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

Ashford, Norman
TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S
HS-027 396

Ashton, S. J.
CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

Asogwa, S. E.
AN ON-THE-SPOT STUDY OF MOTORCYCLE ACCIDENTS IN NIGERIA
HS-028 482

Augustyn, K.
PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

Austin, Richard H.
AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

Backaitis, Stanley
DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

Baird, Jack D.
A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

Baker, Susan P.
CHILDREN KILLED IN CRASHES
HS-028 491

Balthazard, M.
PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

Barbarek, Louis A. C.
PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

Bell, William G.
TRANSPORT FOR THE ELDERLY AND THE HANDICAPPED--AN OVERVIEW FROM THE LATE 70'S
HS-027 396

Belohoubek, Erwin
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

Benson, J. B.
EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

Bergan, A. T.
THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

Berke, George B.
A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

Best, A
HYDRAGAS SUSPENSION
HS-027 358

Bez, Ulrich
THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

Biagi, Angelo
A SAFETY SEAT WITH INCORPORATED BELTS. STUDY
HS-028 398

Biard, Roger
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Billault, Pierre
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Bimson, S.
PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

Blomberg, Richard D.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

Bloomfield, Pamela
SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

Bobo, Stephen
ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

Boehly, William A.
UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

Bogdan, Leonard
RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

Boulton, Fred W.
HYDRO-AIR BRAKE SYSTEM
HS-028 448

Boziuk, Joseph
PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

Brasche, R.
OCCUPANT PROTECTION IN FRONTAL IMPACTS
HS-028 409

Brun, Francoise
A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

Buchwald, P.
IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

Buckins, R. O.
HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

Buhlman, M. A.
PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

Bullin, Jerry A.
DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

Burgess, W. T.
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

Burgett, August
STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

Cameron, M. H.
THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

Campbell, B. J.
THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

Carlson, William L.
STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)
HS-028 501

Casey, Edward L.
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

Castan, F.
A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

Cheng, R.
A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

Chidini, Luciano
DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

Child, James R.
A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

Chipman, M. L.
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION
HS-028 481

Christensen, G.
IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

Cislo, C. J.
DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

Clarkson, Kenneth W.
REGULATING CHRYSLER OUT OF BUSINESS?
HS-027 389

Cohen, Daniel
CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD
HS-028 445

Cohen, Mitchell E.
A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

Cooley, Peter
A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

Cooper, Tom
COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410

Cord, P.
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Council, Forrest M.
EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

Dance, Murray
SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

Danforth, John P.
OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

Daniel, Samuel , Jr.
CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD
HS-028 445

Daniels, Jeffrey
FALLING ON DEAF EARS? (NOISE REGULATIONS)
HS-027 344

Danner, M.
COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS
HS-028 433

Darenberg, Wolfgang
ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

Davis, John W.
IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

Day, Richard
CHECKING AND REPAIRING YOUR CAR'S AUTOMATIC CHOKE
HS-027 399

Dejeammes, Maryvonne
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Delmas, A.
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Dertian, H. H.
TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

DeLarm, L. A.
UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

DeVivo, M. J.
RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

Didion, John M.
A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

Domandl, H.
AM GENERAL/M.A.N. ARTICULATED BUS
HS-027 346

Driscoll, C.
PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

Dulla, Robert
FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

Dworkin, Michael G.
SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

Dyche, Alan K.
IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

Echavidre, Jean-Pierre
PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

Edlund, Ray
AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM
HS-027 379

Enke, Kurt
POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

Enserink, Bert
SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

Eppinger, Rolf H.
A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

CONSIDERATIONS IN SIDE IMPACT DUMMY DEVELOPMENT
HS-028 415

CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD
HS-028 445

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

Ervin, Robert D.
ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

Esmailzadeh, E.
DESIGN SYNTHESIS OF A VEHICLE SUSPENSION SYSTEM USING MULTI-PARAMETER OPTIMIZATION
HS-027 390

Farris, John A.
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227-"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

Fayon, Andre
A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Fell, James C.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

Fine, P. R.
RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

Finkelstein, Michael
U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE
HS-028 461

Flannagan, M. J.
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

Flynn, Sydwell
SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

Foret-Bruno, J. Y.
COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

Franchini, Enzo
SIDE COLLISION
HS-028 422

Friedel, B.
DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

Fujiki, Norio
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

Fujiwara, Toshihisa
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

Fukuda, Shigeo
A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

Furukawa, Yoshimi
A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

Gajendra Babu, M. K.
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

Gehrking, James N.
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

Gloyns, P. F.
THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

Got, C.
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Goto, K.
EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

Gou, Michel
IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

Gratadour, Jean
PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

Green, Nicholas J.
DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW-WIND SPEEDS
HS-027 338

Green, Robert N.
SEAT BELT LEGISLATION
HS-028 464

Griffiths, D. K.
THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

Hackney, James R.
STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

Haffner, Mark
DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

Hall, William L.
EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

Halstead-Nussloch, R.
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

Harmon, Jerry B.
A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

Harris, J.
SAFER CARS FOR PEDESTRIANS
HS-028 443

Hartmann, Francois
COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

Hayes, H. R. M.
THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

Hedlund, James H.
PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY
HS-804 188

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

Hirabayashi, Hiroshi
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

Hirayama, T.
EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

Hoban, J. T.
DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

Hoefs, Rainer
THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

Hoffmann, Errol R.
CONSPICUITY OF MOTORCYCLES
HS-027 387

Hofmann, Jens
PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS
HS-028 414

Holiday, G. W.
TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

Humphrey, J. A. C.
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

Hutchins, F. Peter
THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

Ichinose, Osamu
MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

Iida, Susumu
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

Ilovich, M.
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

Itoh, Masahiro
ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION
HS-028 432

Iwabe, Akira
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

Iwata, Toru
A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

Jacobson, Marcus A.
VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING
HS-028 459

Jaksch, Friedrich O.
VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

Janakiraman, P. A.
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

Janicki, Ed
PLASTICS MOVE FROM TOY CARS (TO REAL AUTOMOBILES)
HS-027 340

Jenoc, Pierre
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Johannessen, George F.
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

Johannessen, H. George
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

Johnston, I. R.
THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

Jones, Gordon W.
MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES
HS-027 383

Jones, I. S.
ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

Kadlec, Charles W.
REGULATING CHRYSLER OUT OF BUSINESS?
HS-027 389

Kaplan, R. J.
A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

Karnopp, Dean C.
VEHICLE RESPONSE TO STOCHASTIC ROADWAYS
HS-027 391

Karwacki, Jerome J. , Jr.
CHILDREN KILLED IN CRASHES
HS-028 491

Kawahara, Yoshio
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

Ketcham, Brian
OUR UNEXAMINED AUTOMOBILE CULTURE
HS-027 397

Kimura, Kenji
INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS
HS-028 460

King, Albert I.
A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

Kiyoto, Masami
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

Knaff, P. Robert
IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER
HS-027 404

Kramer, Florian
PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS
HS-028 414

Kramer, Martin
IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

Kuechenmeister, Timothy J.
A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

Kuhlemeier, K. V.
RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT
HS-028 465

Kurimoto, Koji
MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

Laffer, Arthur B.
REGULATING CHRYSLER OUT OF BUSINESS?
HS-027 389

Lai, James S.
A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

Lakshminarayanan, P. A.
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

Langwieder, Klaus
COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS
HS-028 433

Larsen, H.
IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

Lax, David
FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

Lehman, R. J.
PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

Lestrelin, D.
A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

Leung, Y. C.
PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

Lile, W.
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

Lippmann, Otto
THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE
HS-028 479

Loyat, Bernard
IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT
HS-028 426

Lucchini, E.
EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

Mackay, G. M.
CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

Malchow, G. L.
HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

Malliaris, A. C.
U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE
HS-028 461

Mallikarjunarao, Chalasani
ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

Manicardi, Silvio
INTEGRAL OR COMBINED BRAKING SYSTEM FOR MOTORCYCLES
HS-028 446

Mantovani, F.
DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

Mardosa, Peter
PARTICLE COUNTER PHYSICS
HS-027 381

Marx, R.
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

Masland, Richard L.
THE PHYSICIAN'S RESPONSIBILITY FOR EPILEPTIC DRIVERS
HS-027 412

McDermott, G.
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

McDonald, Quentin H.
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

McKnight, A. James
YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES
HS-028 480

McLean, Robert
PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

McNutt, Barry
FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

Melvin, John W.
EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

Milne, P. W.
FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

Mital, N. K.
A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

Mitter, Eric
THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

Morgan, Richard M.
A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

Morita, Satoshi
A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

Morris, J. B.
UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

Morrison, Andrew J.
A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

Moscarini, Filippo
A SAFETY SEAT WITH INCORPORATED BELTS. STUDY
HS-028 398

Moskowitz, Herbert
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

Moulton, A E.
HYDRAGAS SUSPENSION
HS-027 358

Murthy, B. S.
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

Muto, Yoshitaka
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

Nakaya, Hirosuke
MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE
HS-028 402

Neilson, Ian D.
IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT
HS-028 403
IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

Nelson, Derek
FORKLIFTS: TINY TRUCKS, BIG HAZARDS
HS-027 386

Nicholson, Robert M.
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

Nisonger, Robert L.
ELIMINATING YAW INSTABILITY IN TRACTOR-SEMITRAILERS DURING CORNERING
HS-027 402

Niven, Jeff
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

Norbye, Jan P.
SLASHING AERODYNAMIC DRAG: HOW COMPUTERS REDESIGN A CAR FOR MORE MPG
HS-027 341

O'Day, J.
A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

O'Keefe, E. J.
INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN
HS-027 352

O'Neill, Brian
OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

Oguchi, Yasuhei
THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

Olson, P. L.
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

Oser, Polat
CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS
HS-027 348

Paarlberg, William T.
INDICATORS OF DRIVER INATTENTION
HS-028 472

Pan, S. S.
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

Panik, Ferdinand
ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

Partyka, Susan C.
FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

Pasta, M.
AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

Patel, A.
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Pedersen, P. Sunn
IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY
HS-027 347

Penoyre, Slade
IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT
HS-028 403

IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

Persicke, Gunter
A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

Petty, S. P. F.
IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT
HS-028 403

IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

Pierce, Janace A.
SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

Pinkwas, Stan
OUR UNEXAMINED AUTOMOBILE CULTURE
HS-027 397

Polasek, John C.
DISPERSION OF CARBON MONOXIDE FROM ROADWAYS AT LOW WIND SPEEDS
HS-027 338

Prisk, Bert C.
OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

Pritz, Howard B.
DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION
HS-028 442

Provensal, Jacques
OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

Pruitt, Charles
PEOPLE DOING WHAT THEY DO BEST: THE PROFESSIONAL ENGINEERS AND NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION)
HS-027 398

Psotka, Joseph
YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES
HS-028 480

Pulley, Charles H.
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

Quane, R. P.
MOTORCYCLE ACCIDENT DATA--A VOID TO BE FILLED
HS-028 490

MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM?
HS-028 497

Radley, C. P.
SAFER CARS FOR PEDESTRIANS
HS-028 443

Ramos, J. I.
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

Rattenbury, S. J.
THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

Reidelbach, W.
REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

Reinfurt, Donald W.
THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

Rentz, Richard L.
A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

Riesberg, Ken , ed.
TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS
HS-027 376

Risko, J.
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

Rivett, Debra E.
THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

Robbins, Delmar H.
EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

Robertson, Gerald F.
A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES
HS-027 349

Robertson, Leon S.
PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

Robinson, Allen R.
MOTORCYCLE RIDER COURSE FEASIBILITY STUDY
HS-028 486

Rolland, Bill , ed.
TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS
HS-027 376

Rosen, J.
RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)
HS-028 450

Rosenau, Wolfgang
DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS
HS-028 401

Rosey, J. P.
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Rudisill, Michael D.
THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

Sabey, Barbara E.
ACCIDENT INVESTIGATION TECHNIQUES FOR SECONDARY SAFETY
HS-028 430

Saito, K.
EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

Sanburn, G. W.
TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

Sanders, Robert S.
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

Sano, Shoichi
A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434
THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

Schaller, Robin E.
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

Scharbach, G. W.
AM GENERAL/M.A.N. ARTICULATED BUS
HS-027 346

Schimkat, H.
A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS
HS-028 406

Schmid, W.
REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

Schmidt-Clausen, Hans-Joachim
IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

Seaton, Michael
55 ALIVE/MATURE DRIVING
HS-028 483

Seiffert, Ulrich
LATERAL COLLISION TESTS
HS-028 423

Sharma, Satanand
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

Sharpe, Gilbert S.
SEAT BELT LEGISLATION
HS-028 464

Shiels, A. Carl
THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

Shinar, David
INDICATORS OF DRIVER INATTENTION
HS-028 472

Shinkai, Hiroaki
INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS
HS-028 460

Simpson, H. M.
PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

Singh, Trilochan
MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

Sirignano, W. A.
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

Sivak, M.
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

Soardo, Paolo
AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

Sorenson, S. C.
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

Spindt, R. S.
THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

Staats, Elmer B.
STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

Stahl, H.-W.
THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

Stalnaker, R. L.
PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

Stcherbatcheff, Georges
PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

Steiner, Diana
IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

Strother, Charles E.
A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION
HS-028 410

Stutenkemper, P.
OCCUPANT PROTECTION IN FRONTAL IMPACTS
HS-028 409

Sugiura, Seiichi
INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS
HS-028 460

Surakomol, Kosol
MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

Tarriere, Claude
A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Thomas, C.
COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

Thompson, A. L.
WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

Timbario, Thomas J.
A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

Tisseron, C.
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Tokoro, N.
EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

Triemstra, R. H.
DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

Vanosdall, Fred E.
THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

Ventre, Philippe
RESULTS OF COMPARATIVE FRONTAL CRASH TESTS
HS-028 404

Verreault, R.
WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

Versace, John
SAFETY SYSTEMS OPTIMIZATION MODEL
HS-028 399

Viergutz, O. J.
PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

Vilardo, Frank J.
THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

Viner, John G.
VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE
HS-028 492

Wagner, Reinhard
MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

Walfisch, G.
PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Wanke, Thomas S.
INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

Warner, Charles Y.
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

PASSIVE PROTECTION: PROMULGATION OR POLITICS
HS-028 474

Warren, R. A.
PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS
HS-028 466

Watson, L. Glen
THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

Weidemann, Wolfgang
ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

Weissner, Rudiger
DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS
HS-028 401

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

Williams, Allan F.
OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

Williams, Martin J.
CONSPICUITY OF MOTORCYCLES
HS-027 387

Williamson, W. A.
HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 378

Wong, Jackson
OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

Wright, Paul H.
PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

Yamada, M.
EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES
HS-027 350

Zaidel, David M.
INDICATORS OF DRIVER INATTENTION
HS-028 472

Ziedman, Kenneth
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

Ziegler, Peter N.
IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER
HS-027 404

Zimmermann, Gunther
DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGINEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

Corporate Author Index

Alfa Romeo, Italy
DEFINITION OF THE VEHICLE DYNAMIC CHARACTERISTICS BY THE TRANSFER FUNCTION: CORRELATION WITH SUBJECTIVE EVALUATION
HS-028 454

American Acad. of Pediatrics, Tennessee Chapter
THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT
HS-028 467

American Assoc. for Automotive Medicine, P.O. Box 222, Morton Grove, Ill. 60053
AMERICAN ASSOCIATION FOR AUTOMOTIVE MEDICINE ANNUAL CONFERENCE (23RD) PROCEEDINGS, LOUISVILLE, KENTUCKY, OCT. 4-6, 1979
HS-028 462

American Seat Belt Council
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

Association Peugeot-Renault, France
COMPATIBILITY OF MASSES AND STRUCTURES IN CAR-TO-CAR LATERAL COLLISIONS
HS-028 435

Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, France
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

PRESENTATION OF A FRONTAL IMPACT AND SIDE IMPACT DUMMY, DEFINED FROM HUMAN DATA AND REALIZED FROM A "PART 572" BASIS
HS-028 417

A SYNTHESIS OF AVAILABLE DATA FOR IMPROVEMENT OF PEDESTRIAN PROTECTION
HS-028 437

Audi NSU Autounion A.G., Federal Republic of Germany
IMPROVED PEDESTRIAN PROTECTION BY REDUCING THE SEVERITY OF HEAD IMPACT ONTO THE BONNET (HOOD)
HS-028 440

MARKET-RELATED PASSENGER CAR DESIGN TO IMPROVE COLLISION PROTECTION FOR "OWN" VEHICLE AND "OTHER" VEHICLE
HS-028 400

Automated Sciences Group, Inc., 8555 16th St., Suite 713, Silver Spring, Md. 20910
FUEL ECONOMY MODELS (FUEL AND FUEL6)
HS-027 373

Automobile Assoc., U.K.
VEHICLE SAFETY CAR HANDLING AND BRAKING: LEGISLATION CAN NOT COVER EVERYTHING
HS-028 459

Avis Rent-A-Car Systems, Inc.
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

AM General Corp.
AM GENERAL/M.A.N. ARTICULATED BUS
HS-027 346

Battelle Columbus Labs.
DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

VEHICLE DESIGN FOR PEDESTRIAN PROTECTION
HS-028 442

Ben Gurion Univ., Dept of Industrial Engineering, Israel
INDICATORS OF DRIVER INATTENTION
HS-028 472

Bobby-Mac Co., Inc., Scarsdale, N.Y.
REARWARD-FACING INFANT RESTRAINTS: OPTIMUM RECLINING ANGLES FOR THE DESIGN OF SAFER, MORE PROTECTIVE AND COMFORTABLE RESTRAINTS
HS-028 500

Brigham Young Univ., Dept. of Mechanical Engineering, Provo, Utah 84602
A PROTOTYPE LOAD-SENSING DUMMY FACEFORM TEST DEVICE FOR FACIAL INJURY HAZARD ASSESSMENT
HS-028 468

Brigham Young Univ., Provo, Utah 84602
PASSIVE PROTECTION: PROMULGATION OR POLITICS
HS-028 474

Calspan Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14221
RESULTS OF ENERGY-LOSS MEASUREMENTS ON PASSENGER CAR TIRES OPERATING IN THE FREE-ROLLING AND BRAKING/TRACTION MODES. FINAL REPORT
HS-805 224

Calspan Corp., Buffalo, N.Y.
SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

Citroen, Res. Dept., France
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Clark Equipment Co., Corporate Devel. Center
HYDRAULIC COMPONENT CLEANLINESS TESTING--METHODS AND RESULTS
HS-027 378

Commonwealth Dept. of Transport, Office of Road Safety, Box 1839Q G.P.O., Melbourne, Vic., 3001 Australia
THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

Commonwealth Dept. of Transport, Office of Road Safety, G.P.O. Box 1839Q, Melbourne, Vic. 3001, Australia
FITTING AND WEARING OF SEAT BELTS IN AUSTRALIA. THE HISTORY OF A SUCCESSFUL COUNTERMEASURE
HS-027 395

Crain and Associates, 1145 Merrill St., Menlo Park, Calif. 94025
COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CALIFORNIA. FINAL REPORT
HS-027 410
SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA. FINAL REPORT
HS-027 411

Daimler-Benz A.G., Passenger Car Body Res. Dept., Federal Republic of Germany
REALISTIC TEST CONDITIONS FOR EVALUATION OF PASSENGER CAR OCCUPANT PROTECTION
HS-028 420

Daimler-Benz A.G., Passenger Car Chassis Design, Federal Republic of Germany
POSSIBILITIES FOR IMPROVING SAFETY WITHIN THE DRIVER-VEHICLE-ENVIRONMENT CONTROL LOOP
HS-028 451

Daimler-Benz A.G., Vehicle Res., Federal Republic of Germany
ANALYSIS OF THE CONTROL SYSTEM "DRIVER-VEHICLE-ROAD"
HS-028 452

Dayton T. Brown, Inc.
PARTICLE COUNTER PHYSICS
HS-027 381

De Lorean Motor Co.
PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

Denver Urban Observatory, Technological Innovation Center, Box A097 University Center, 4200 East Ninth Ave., Denver, Colo. 80220
IDEAL POLICE CAR, 1978 TECHNICAL REPORT, 2ND ED.
HS-027 342

Department of Energy
FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

Department of Energy, Assistant Secretary for Conservation and Solar Applications, Washington, D.C. 20545
ELECTRIC HYBRID VEHICLE RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAM. ENVIRONMENTAL ASSESSMENT
HS-027 375

Department of Energy, Office of Transportation Programs, Washington, D.C. 20545
PROJECT PLANNING DOCUMENT. HIGHWAY VEHICLE ALTERNATIVE FUELS UTILIZATION PROGRAM (AFUP)
HS-027 372

Donaldson Co., Inc.
THE SIGNIFICANCE AND PREPARATION OF CLASSIFIED TEST CONTAMINANTS
HS-027 382

Dunlap and Associates, Inc.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

Dunlop Ltd. Engineering Group, England
IMPROVING THE STABILITY OF A COMMERCIAL VEHICLE WHEN BRAKED
HS-028 447

Dynamic Science, Inc., Downey, Calif.
A PRELIMINARY STUDY OF THE PERFORMANCE OF AFTERMARKET STEERING WHEELS IN FRONTAL IMPACTS
HS-028 499

Dynamic Science, Inc., Phoenix, Ariz.
SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS
HS-027 403

Ecole Polytechnique, Dept. of Mechanical Engineering Campus de 1' Universite de Montreal, Montreal, Que., Canada
IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

Energy and Environmental Analysis, Inc.
FACTORS INFLUENCING AUTOMOTIVE FUEL DEMAND
HS-027 374

Environmental Protection Agency
THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

European Car Manufacturers, Crashworthiness Working Group (CCMC)
RESULTS OF COMPARATIVE FRONTAL CRASH TESTS
HS-028 404

European Car Manufacturers, Crashworthiness Working Group
LATERAL COLLISION TESTS
HS-028 423

Federal Hwy. Administration, Washington, D.C. 20590
VEHICLE DOWNSIZING AND ROADSIDE SAFETY HARDWARE
HS-028 492

Federal Hwy. Res. Inst. (Bundesanstalt fur Strassenwesen), Federal Republic of Germany
DATA BASE FOR ACCIDENT AND SAFETY RESEARCH ON THE SECTOR OF AUTOMOTIVE ENGI-

NEERING: GENERAL ASPECTS OF DATA REQUIREMENTS AND SUPPLY
HS-028 431

Federal Hwy. Res. Inst., Cologne, Federal Republic of Germany
DRIVING TESTS UNDER THE EFFECTS OF BETA RECEPTOR BLOCKING DRUGS
HS-028 470

Fiat S.p.A., Safety Center, Italy
SIDE COLLISION
HS-028 422

Firestone Tire and Rubber Co., Hamill Mfg. Div.
ASSESSMENT OF SEAT BELT USAGE--METHODS/RESULTS/RECOMMENDATIONS
HS-027 405

Ford Motor Co.
TURBOCHARGING FORD'S 2.3 LITER SPARK IGNITION ENGINE
HS-027 353

Ford Motor Co., Dearborn, Mich.
MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

Ford Motor Co., Safety Res.
SAFETY SYSTEMS OPTIMIZATION MODEL
HS-028 399

Ford-Werke A.G., Product Devel. Group, Federal Republic of Germany
OCCUPANT PROTECTION IN FRONTAL IMPACTS
HS-028 409

Foxboro Analytical, Burlington, Mass.
FERROGRAPHIC ANALYSIS FOR HYDRAULIC FLUIDS
HS-027 384

Fram Corp., Providence, R.I.
MULTIPLE LOCATION RADIOACTIVE WEAR ANALYSIS TECHNIQUES
HS-027 383

General Accounting Office, Office of the Comptroller General, Washington, D.C. 20548
STRONGER FEDERAL DIRECTION NEEDED TO PROMOTE BETTER USE OF PRESENT URBAN TRANSPORTATION SYSTEMS. REPORT TO THE CONGRESS
HS-027 388

General Motors Corp.
A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

General Motors Corp., Cadillac Motor Car Div.
DESIGN AND DEVELOPMENT OF AN INDEPENDENT REAR SUSPENSION FOR THE 1979 CADILLAC ELDORADO
HS-027 359

General Motors Res. Labs.
A STUDY OF THERMAL ENERGY CONSERVATION IN EXHAUST PIPES
HS-027 349

General Motors Res. Labs., Biomedical Science Dept., Warren, Mich. 48090
OCCUPANT RESTRAINT SYSTEM MODELING USING THE MVMA (MOTOR VEHICLE MANUFACTURERS ASSOCIATION) TWO-DIMENSIONAL OCCUPANT DYNAMICS MODEL
HS-028 475

Georgia Inst. of Tech., School of Civil Engineering
PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

Georgia Inst. of Tech., School of Civil Engineering, Atlanta, Ga. 30332
A MANUAL FOR DESIGN AND CONSTRUCTION OF BICYCLE PATH PAVEMENTS. FINAL REPORT
HS-027 409

Gulf Science and Tech. Co.
THE EFFECT OF AMBIENT TEMPERATURE VARIATION ON EMISSIONS AND FUEL ECONOMY--AN INTERIM REPORT
HS-027 401

Honda Motor Co., Ltd., Japan
A STUDY OF DRIVER CONTROL BEHAVIOR BASED ON ACCIDENT INVESTIGATIONS.
HS-028 434

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE
HS-028 455

HUK Verband (German Assoc. of 3rd Party, Accident, Motor Vehicle and Legal Protection Insurers), Automobile Engineering Dept., Federal Republic of Germany
COLLISION CHARACTERISTICS AND INJURIES TO PEDESTRIANS IN REAL ACCIDENTS
HS-028 433

Indian Inst. of Tech., Delhi
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

Indian Inst. of Tech., Madras
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

Indiana Univ., Inst. for Res. in Public Safety
INDICATORS OF DRIVER INATTENTION
HS-028 472

Indiana Univ., Inst. for Res. in Public Safety, Bloomington, Ind. 47405
THE IMPACT OF MOTOR VEHICLE INDUCED TRAUMA ON HOSPITAL USEAGE (SIC): AN EXPLORATORY STUDY
HS-028 488

Insurance Inst. for Hwy. Safety, Watergate 600, Washington, D.C. 20037
OCCUPANT PROTECTION IN INTERIOR IMPACTS. AN ANALYSIS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD NO. 201
HS-028 493

International Harvester
AN AGRICULTURE EQUIPMENT MANUFACTURER'S APPROACH TO ASSURE A CLEAN HYDRAULIC SYSTEM
HS-027 379

Istituto Elettrotecnico Nazionale Galileo Ferraris, Italy
AN OPTIMUM VISIBILITY DESIGN FOR THE STOP LAMP (BRAKE LIGHT)
HS-028 457

Istituto Sperimentale Auto e Motori S.p.A., Italy
A SAFETY SEAT WITH INCORPORATED BELTS. STUDY
HS-028 398

IIT Res. Inst., Transportation Div., 10 West 35th St., Chicago, Ill. 60616
PASSENGER CAR/PEDESTRIAN IMPACT PROTECTION SYSTEM EVALUATION. FINAL REPORT
HS-805 216

IRO/IRBA--Hopital Raymond Poincare, France
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Japan Automobile Res. Inst., Inc.
ANALYSIS OF PEDESTRIAN ACCIDENTS TAKEN FROM A ROAD TRAFFIC ACCIDENT INVESTIGATION
HS-028 432

Johns Hopkins School of Public Health, Baltimore, Md.
CHILDREN KILLED IN CRASHES
HS-028 491

Laboratoire d'Anatomie de l'Unite d'Enseignement et de Recherches Biomedicales des Saints Peres, France
SYNTHESIS OF HUMAN TOLERANCES OBTAINED FROM LATERAL IMPACT SIMULATIONS
HS-028 412

Leyland Vehicles, England
HYDRO-AIR BRAKE SYSTEM
HS-028 448

Lincorp Res., Inc.
SELECTION BIASES IN THE SAMPLING AND MEASUREMENT OF SAFETY BELT USE
HS-027 407

Logical Technical Services Corp., 311 Maple Ave. West, Vienna, Va. 22180
A PLAN FOR REGIONAL COOPERATION: PUBLIC INFORMATION AND EDUCATION FOR HIGHWAY SAFETY INCLUDING COMMUNICATIONS PLANS AND STRATEGIES. FINAL REPORT
HS-805 217

M.H. Cameron and Associates, 17 Myrtle Grove, Blackburn, Vic., 3130 Australia
THE USE OF TELEVISION PUBLICITY TO MODIFY SEAT BELT WEARING BEHAVIOUR
HS-027 394

Market Opinion Res.
A COMPARATIVE ANALYSIS OF FACTORS IMPACTING ON SEAT BELT USE
HS-027 408

Maschinenfabrik Augsburg-Nuernberg Aktiengesellschaft
AM GENERAL/M.A.N. ARTICULATED BUS
HS-027 346

McGill Univ., Dept. of Mechanical Engineering, Montreal Que., Canada
WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

McGill Univ., Dept. of Mechanical Engineering, Montreal, Que., Canada
IS FURTHER LEGISLATION REQUIRED TO INCREASE SCHOOL BUS SAFETY?
HS-028 477

McMaster Univ., Hamilton, Ont. Canada
SEAT BELT LEGISLATION
HS-028 464

Michigan Dept. of State, Bureau of Field Services, Lansing, Mich.
THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

Michigan State Safety Commission
AN ALCOHOL, DRUG AND HIGHWAY SAFETY CONFERENCE IN MICHIGAN
HS-028 498

Michigan State Univ., Hwy. Traffic Safety Center, East Lansing, Mich.
THE NEW MICHIGAN DRIVER PERFORMANCE TEST
HS-028 473

Milwaukee (Wis.) School of Engineering, Fluid Power Inst.
INVESTIGATION OF OVERALL EFFICIENCY IN THE FIRST FEW HOURS OF A PUMP'S LIFE
HS-027 377

Minicars, Inc., Goleta, Calif.
A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

Minicars, Inc., Santa Barbara, Calif.
DESIGN OF STEERING COLUMNS FOR PASSIVE RESTRAINT APPLICATION
HS-028 410

Ministry of Transportation and Communication, Systems Res. and Devel. Branch, Downsview, Ont., Canada
SAFETY BENEFITS OF THE SEAT BELT LEGISLATION AND SPEED LIMIT REDUCTION IN ONTARIO
HS-028 484

Mitsubishi Electric Corp., Communication Equipment Works, Japan
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

Montreal Children's Hosp., Montreal, Que., Canada
WHO ARE USING CHILD RESTRAINT SYSTEMS AND WHY--DATA FROM FOUR MAJOR CANADIAN CITIES
HS-028 485

Moto Guzzi--Brembo, Italy
INTEGRAL OR COMBINED BRAKING SYSTEM FOR MOTORCYCLES
HS-028 446

Motor Industry Res. Assoc., England
IMPROVED TEST PROCEDURES FOR SIDE IMPACT
HS-028 421

Motorcycle Safety Foundation, Linthicum, Md.
MOTORCYCLE RIDER COURSE FEASIBILITY STUDY
HS-028 486

Motorcycle Safety Foundation, 780 Elkridge Landing Rd., Linthicum, Md.
MOTORCYCLE ACCIDENT DATA--A VOID TO BE FILLED
HS-028 490

MOTORCYCLE RIDERS AND ALCOHOL--A PROBLEM?
HS-028 497

Moulton Developments Ltd., England
HYDRAGAS SUSPENSION
HS-027 358

Mueller Associates, Inc., Baltimore, Md. 21227
A COMPARISON OF PROJECTED ELECTRIC UTILITY PEAKING GAS TURBINE ENERGY REQUIREMENTS TO POTENTIAL ALCOHOL FUELS AVAILABILITY: 1980-2000
HS-027 371

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

National Hwy. Traffic Safety Administration
IMPROVING SAFETY BELT ACCEPTABILITY TO THE CONSUMER
HS-027 404

POLICE TRAFFIC RADAR: IS IT RELIABLE?
HS-805 261

National Hwy. Traffic Safety Administration, East Liberty, Ohio
A FUNDAMENTAL LOOK AT SIDE IMPACT
HS-028 494

National Hwy. Traffic Safety Administration, Manpower Devel. Div., 400 7th St., S.W., Washington, D.C. 20590
HIGHWAY TRAFFIC SAFETY SELF-INSTRUCTION COURSE. MODULE 8 WORKBOOK. ADMINISTRATIVE EVALUATION. 1ST ED.
HS-900 038

National Hwy. Traffic Safety Administration, National Center for Statistics and Analysis, Washington, D.C. 20590
FATAL ACCIDENTS IN THE FIRST FIFTEEN MONTHS OF THE NATIONAL CRASH SEVERITY STUDY
HS-028 469

PRELIMINARY FINDINGS FROM THE NATIONAL CRASH SEVERITY STUDY
HS-804 188

National Hwy. Traffic Safety Administration, Office of Automotive Fuel Economy Standards
LIGHT TRUCK FUEL ECONOMY STANDARDS. MODEL YEAR 1981. RULEMAKING SUPPORT PAPER
HS-805 259

National Hwy. Traffic Safety Administration, Office of Automotive Fuel Economy Standards, Washington, D.C. 20590
LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981. RULEMAKING SUPPORT PAPER SUPPLEMENT
HS-805 260

National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590
55 MPH FACT BOOK. 4TH ED.
HS-804 979

National Hwy. Traffic Safety Administration, Office of Prog. Evaluation, Washington, D.C. 20590
NHTSA EVALUATION PLAN FOR FEDERAL MOTOR VEHICLE SAFETY STANDARD 208, OCCUPANT CRASH PROTECTION
HS-805 066

National Hwy. Traffic Safety Administration, Office of Program and Rulemaking Analysis
FINAL IMPACT ASSESSMENT OF THE LIGHT TRUCK AND VAN FUEL ECONOMY STANDARDS FOR MODEL YEARS 1980 AND 1981
HS-805 258

National Hwy. Traffic Safety Administration, Office of State Prog. Assistance, Washington, D.C. 20590
COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. PARTICIPANT'S MANUAL
HS-900 034

COURT INTERVENTION: PRE-SENTENCE INVESTIGATION TECHNIQUES FOR DRINKING/DRIVING OFFENSES. INSTRUCTOR'S GUIDE
HS-900 035

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
UPGRADED FRONTAL CRASH PROTECTION FOR MOTOR VEHICLE OCCUPANTS
HS-028 405

CONSIDERATIONS IN SIDE IMPACT DUMMY DEVELOPMENT
HS-028 415

DEVELOPMENT OF THE NHTSA (NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION) ADVANCED DUMMY FOR THE OCCUPANT PROTECTION STANDARD UPGRADE
HS-028 416

STATUS OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S RESEARCH AND RULEMAKING ACTIVITIES FOR UPGRADING SIDE IMPACT PROTECTION
HS-028 424

THE NATIONAL CRASH SEVERITY STUDY AND ITS RELATIONSHIPS TO ESV (EXPERIMENTAL SAFETY VEHICLE) DESIGN CRITERIA
HS-028 429

DEVELOPMENT OF A SIMPLIFIED VEHICLE PERFORMANCE REQUIREMENT FOR PEDESTRIAN INJURY MITIGATION
HS-028 444

CONSIDERATIONS IN THE DEVELOPMENT OF A PEDESTRIAN SAFETY STANDARD
HS-028 445

U.S. MOTOR VEHICLE SAFETY IN PERSPECTIVE
HS-028 461

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES
HS-028 463

INTERNATIONAL TECHNICAL CONFERENCE (7TH) ON EXPERIMENTAL SAFETY VEHICLES, PARIS, JUNE 5-8, 1979
HS-805 199

AN ASSESSMENT OF STATE AND COMMUNITY HIGHWAY SAFETY PROGRAMS, FY 1975-FY 1979
HS-805 228

MARIJUANA, OTHER DRUGS AND THEIR RELATION TO HIGHWAY SAFETY. A REPORT TO CONGRESS
HS-805 229

AIR BAG INFLATOR RELIABILITY
HS-805 257

National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
A MANUAL OF ANTI-THEFT GUIDELINES FOR STATE MOTOR VEHICLE TITLING PROGRAMS
HS-805 198

National Public Services Res. Inst., Alexandria, Va.
YOUTH, ALCOHOL, AND DRIVING: SUBTLE ATTITUDE MEASURES
HS-028 480

National Retired Teachers Assoc./American Assoc. of Retired Persons, Washington, D.C.
55 ALIVE/MATURE DRIVING
HS-028 483

National Safety Council
WHAT'S YOUR EXCUSE?
HS-027 385

Nippon Oil Seal Industry Co., Ltd., Japan
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

Nissan Motor Co., Ltd., Central Engineering Labs., Japan
AUTOMATIC BRAKING SYSTEM. A STUDY (AUTOMATIC COLLISION AVOIDANCE SYSTEM)
HS-028 449

Nissan Motor Co., Ltd., Japan
A STUDY OF THE BODY STRENGTH ON SEAT BELT SYSTEMS
HS-028 407

NOK-USA, Inc.
A STUDY OF LUBRICATION CHARACTERISTICS ON VALVE STEM SEALS FOR AUTOMOBILE ENGINES
HS-027 345

Ontario Ministry of Health
SEAT BELT LEGISLATION
HS-028 464

Organisme National de Securite Routiere (ONSER), Biokinetics and Impact Lab., France
THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)
HS-028 408

Pall Industrial Hydraulics Corp.
STATUS REPORT ON SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) RECOMMENDED PRACTICE J1227--"ASSESSING CLEANLINESS OF HYDRAULIC FLUID POWER COMPONENTS AND SYSTEMS"
HS-027 380

Peugeot, Security Res., France
PEUGEOT VLS 104 AND PEDESTRIAN PROTECTION (EXPERIMENTAL SAFETY VEHICLE)
HS-028 441

Peugeot, Structural Studies and Tests Div., France
IMPROVEMENT IN THE PROTECTION AGAINST SIDE IMPACT
HS-028 426

Porsche A.G., Res. and Devel. Center, Federal Republic of Germany
THE V-SHAPED VEHICLE FRONT--ITS INFLUENCE ON INJURY SEVERITY IN PEDESTRIAN ACCIDENTS AND SIDE COLLISIONS
HS-028 427

Princeton Univ. Guggenheim Labs., Princeton, N.J.
NUMERICAL PREDICTION OF AXISYMMETRIC LAMINAR AND TURBULENT FLOWS IN MOTORED, RECIPROCATING INTERNAL COMBUSTION ENGINES
HS-027 356

Quinton Hazell Ltd., England
A PRACTICAL APPROACH TO REAR UNDERRIDE PROTECTION
HS-028 458

Renault, Res. and Devel. Dept., France
OCCUPANT PROTECTION IN LATERAL COLLISIONS: SPECIAL FEATURES OF RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLE)
HS-028 425

PEDESTRIAN PROTECTION: SPECIAL FEATURES OF THE RENAULT E.P.U.R.E. (ETUDE DE LA PROTECTION DES USAGERS DE LA ROUTE ET DE L'ENVIRONMENT) (EXPERIMENTAL SAFETY VEHICLES)
HS-028 439

Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142
ULTRASONIC INSPECTION OF TEN RETREADED TIRES AND THIRTY-TWO CASINGS. FINAL REPORT
HS-805 019

PERFORMANCE CHARACTERISTICS OF 1977 FORD 300 CID (CUBIC INCH DISPLACEMENT) ENGINE. FINAL REPORT
HS-805 220

Rutherford County Health Dept., Murfreesboro, Tenn. 37130

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT

HS-028 467

RCA Labs.

RADAR-CONTROLLED FUNCTIONS IN THE U.S. RESEARCH SAFETY VEHICLE (RSV)

HS-028 450

Shibaura Inst. of Tech., Japan

THE EFFECT OF IMPROVED VEHICLE DYNAMICS ON DRIVERS' CONTROL PERFORMANCE

HS-028 455

Societe Nationale des Poudres et Explosifs (SNPE), France

THE INFLATABLE DIAGONAL BELT (IMPROVEMENT OF PROTECTION IN THE CASE OF FRONTAL IMPACT)

HS-028 408

Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, Pa. 15096

TOPICS ON CONTAMINATION IN HYDRAULIC SYSTEMS

HS-027 376

MOTOR VEHICLE BRAKING SYSTEMS AND COMPONENTS. STANDARDS, RECOMMENDED PRACTICES, INFORMATION REPORTS

HS-027 393

Southern California Res. Inst., Los Angeles, Calif.

THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE

HS-028 487

Specialty Composites Corp.

INTERIOR NOISE REDUCTION IN A RECREATIONAL VAN

HS-027 352

St. Olaf Coll., Dept. of Economics, Northfield, Minn.

STATISTICAL MODELS FOR POLICY ANALYSIS (HIGHWAY SAFETY)

HS-028 501

Technical University of Denmark, Lab. for Energetics

IMPROVEMENT OF CITYBUS FUEL ECONOMY USING A HYDRAULIC HYBRID PROPULSION SYSTEM--A THEORETICAL AND EXPERIMENTAL STUDY

HS-027 347

Technische Universitat Berlin, Inst. of Automotive Engineering, Federal Republic of Germany

PROTECTION CRITERIA FOR OCCUPANTS AND PEDESTRIANS

HS-028 414

Tennessee Dept. of Public Health, Nashville, Tenn. 37219

THE TENNESSEE CHILD PASSENGER PROTECTION ACT: ORIGIN, LEGISLATIVE SUCCESS, AND NATIONAL IMPACT

HS-028 467

Texas Health Dept., Austin, Tex.

THE EFFECT OF THE TEXAS MEDICAL ADVISORY BOARD FOR DRIVER LICENSING ON DRIVING PERFORMANCE

HS-028 479

Toyo Kogyo Co., Ltd., Japan

MATCHING OF CRASH SENSORS TO CRUSH CHARACTERISTICS OF A VEHICLE

HS-028 402

Toyota Motor Co., Japan

INDIRECT VISIBILITY REQUIREMENTS FOR PASSENGER CARS

HS-028 460

Toyota Motor Co., Ltd.

EXPERIMENTAL ANALYSIS ON EXHAUST GAS TEMPERATURE OF VARIOUS FOUR CYCLE GASOLINE ENGINES

HS-027 350

Traffic Injury Res. Foundation of Canada, Ottawa, Ont., Canada

PROFILES OF FATAL COLLISIONS INVOLVING CHILD PEDESTRIANS

HS-028 466

Transport and Road Res. Lab., England

ACCIDENT INVESTIGATION TECHNIQUES FOR SECONDARY SAFETY

HS-028 430

IMPROVED TEST PROCEDURES FOR FRONTAL IMPACT

HS-028 403

IMPROVED TEST PROCEDURES FOR SIDE IMPACT

HS-028 421

SAFER CARS FOR PEDESTRIANS

HS-028 443

Transport Canada, Road and Motor Vehicle Traffic Safety Branch

SAFETY PERFORMANCE EVALUATION OF SEAT BELT RETRACTORS

HS-027 403

Transportation Agency, Traffic Safety Programs, Regina, Sask., Canada

THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN

HS-028 496

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418

HIGHWAY SAFETY RESEARCH, DEVELOPMENT, AND DEMONSTRATION: CONFERENCE PROCEEDINGS. FINAL REPORT

HS-805 231

Univ. of Santa Clara, Calif.

PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE

HS-027 357

University of Alabama in Birmingham - Medical Center, Dept. of Rehabilitation Medicine, Birmingham, Ala.

RESIDUAL CARDIOVASCULAR DAMAGE RESULTING FROM NONPENETRATING STEERING WHEEL IMPACT

HS-028 465

University of Birmingham, Dept. of Transportation and Environmental Planning, Birmingham, England
PATTERNS OF INJURY IN PEDESTRIAN ACCIDENTS
HS-028 478

University of Birmingham, Transportation and Environmental Planning Dept., England
CAR DESIGN FOR PEDESTRIAN INJURY MINIMIZATION
HS-028 436

University of Birmingham, Transportation and Environmental Planning Dept., Birmingham, England
THE BIOMECHANICAL LIMITS OF SEAT BELT PROTECTION
HS-028 476

University of California at Los Angeles
THE EFFECT OF A SINGLE ACUTE DOSE OF DIAZEPAM ON DRIVING-RELATED SKILLS PERFORMANCE
HS-028 487

University of Illinois at Urbana-Champaign, Dept. of Mechanical and Industrial Engineering, Urbana, Ill.
HEAT TRANSFER IN THE STRAIGHT SECTION OF AN EXHAUST PORT OF A SPARK IGNITION ENGINE
HS-027 351

University of Illinois at Urbana-Champaign, Mechnical and Industrial Engineering Dept., Urbana, Ill. 61801
A ONE-DIMENSIONAL COMBUSTION MODEL FOR A DUAL CHAMBER STRATIFIED CHARGE SPARK IGNITION ENGINE
HS-027 355

University of Maryland School of Medicine, Baltimore, Md.
CHILDREN KILLED IN CRASHES
HS-028 491

University of Michigan, Hwy. Safety Res. Inst.
A STUDY OF VARIOUS SIDE-IMPACT CONFIGURATIONS.
HS-028 428

ALCOHOL AND HIGHWAY SAFETY 1978. A REVIEW OF THE STATE OF KNOWLEDGE. SUMMARY VOLUME
HS-805 172

EXPERIMENTAL APPLICATION OF ADVANCED THORACIC INSTRUMENTATION TECHNIQUES TO ANTHROPOMORPHIC TEST DEVICES
HS-028 418

PREDICTION OF THORACIC INJURIES AS A FUNCTION OF OCCUPANT KINEMATICS
HS-028 413

University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
EVALUATION OF THE FEASIBILITY OF A SINGLE-BEAM HEADLIGHTING SYSTEM. FINAL REPORT
HS-805 219

University of Nigeria Teaching Hosp., Enugu, Nigeria
AN ON-THE-SPOT STUDY OF MOTORCYCLE ACCIDENTS IN NIGERIA
HS-028 482

University of North Carolina, Hwy. Safety Res. Center
THE DEGREE OF BENEFIT OF BELTS IN REDUCING INJURY--AN ATTEMPT TO EXPLAIN STUDY DISCREPANCIES
HS-027 406

University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C.
EFFECTS OF PEDIATRIC EDUCATION ON THE USE OF CHILD RESTRAINT DEVICES IN NORTH CAROLINA
HS-028 471

University of Oxford, Dept. of Engineering Science, Oxford, England
ANALYTICAL RECONSTRUCTION OF 12 STAGED COLLISIONS USING THE CRASH (CALSPAN RECONSTRUCTION OF ACCIDENT SPEEDS ON THE HIGHWAY) 2 AND SMAC (SIMULATION MODEL OF AUTOMOBILE COLLISION) PROGRAMS
HS-028 495

University of Saskatchewan, Saskatoon, Sask., Canada
THE EFFECT ON INJURY AND FATALITY RATES DUE TO SEATBELT USAGE IN SASKATCHEWAN
HS-028 496

University of Technology, Loughborough, England
PREDICTION OF GAS EXCHANGE PROCESSES IN A SINGLE CYLINDER INTERNAL COMBUSTION ENGINE
HS-027 357

University of Toronto, Dept. of Preventive Medicine and Biostatistics, Toronto, Ont., Canada
ARE ALL DRIVERS WHO DRIVE AT HIGH RISK? THE ROLE OF EXPOSURE IN DETERMINING THE RISK OF COLLISION
HS-028 481

University of Western Ontario, London, Ont., Canada
SEAT BELT LEGISLATION
HS-028 464

Volkswagenwerk A.G., Federal Republic of Germany
A CONCEPT OF INCREASING COMPATIBILITY OF PASSENGER CARS
HS-028 406

Volkswagenwerk A.G., Res. and Devel., Federal Republic of Germany
DEVELOPMENT AND PERFORMANCE OF PASSIVE RESTRAINT SYSTEMS
HS-028 401

EXPERIMENTAL SIMULATIONS OF CAR-TO-PEDESTRIAN COLLISIONS WITH VW-PRODUCTION CARS. RESULTS
HS-028 438

Volkswagenwerk AG
CATALYST SYSTEMS WITH AN EMPHASIS ON THREE-WAY CONVERSION AND NOVEL CONCEPTS
HS-027 348

Volvo Car Corp., Sweden
VEHICLE CHARACTERISTICS DESCRIBING THE STEERING CONTROL QUALITY OF CARS
HS-028 453

Wayne State Univ., Bioengineering Center
A NEW DESIGN FOR A SURROGATE SPINE
HS-028 419

August 31, 1980

Wayne State Univ., Mechanical Engineering Dept., Detroit, Mich.
MATHEMATICAL MODELING OF COMBUSTION PROCESS IN A SPARK-IGNITION ENGINE
HS-027 354

Westfalische Metall Industrie Hueck and Co., Federal Republic of Germany
IMPROVEMENT OF REAR AND FRONT LIGHTING SYSTEMS FOR MOTOR VEHICLES
HS-028 456

Yale Univ., Center for Health Studies
PLANNING ROADSIDE SAFETY IMPROVEMENT PROGRAMS
HS-028 489

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Contract Number Index

Canada-CCA-7485-S49-2-7-0016
McGill Univ., Dept. of Mechanical Engineering, Montreal Que., Canada; Montreal Children's Hosp., Montreal, Que., Canada
HS-028 485

DAAG-29-76-G-0265
University of Illinois at Urbana-Champaign, Dept. of Mechanical and Industrial Engineering, Urbana, Ill.
HS-027 351

DOE-EX-76-C-01-2098
Mueller Associates, Inc., Baltimore, Md. 21227
HS-027 371

DOT-HS-5-01232
Wayne State Univ., Bioengineering Center; National Hwy. Traffic Safety Administration, Washington, D.C. 20590
HS-028 419

DOT-HS-7-01552
RCA Labs.
HS-028 450

DOT-HS-7-01554
University of Michigan, Hwy. Safety Res. Inst., Huron Pkwy. and Baxter Rd., Ann Arbor, Mich. 48109
HS-805 219

DOT-HS-9-02112
IIT Res. Inst., Transportation Div., 10 West 35th St., Chicago, Ill. 60616; De Lorean Motor Co.
HS-805 216

DOT-HS-9-02113
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
HS-805 231

DOT-HS-9-02154
Logical Technical Services Corp., 311 Maple Ave. West, Vienna, Va. 22180
HS-805 217

DOT-OS-50226
Georgia Inst. of Tech., School of Civil Engineering, Atlanta, Ga. 30332
HS-027 409

DOT-TS-15361
Calspan Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14221
HS-805 224

DOT-TS-15581
Calspan Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14221
HS-805 224

DOT-TSC-1081
Crain and Associates, 1145 Merrill St., Menlo Park, Calif. 94025
HS-027 410

Crain and Associates, 1145 Merrill St., Menlo Park, Calif. 94025
HS-027 411

ISR-75-22829
Denver Urban Observatory, Technological Innovation Center, Box A097 University Center, 4200 East Ninth Ave., Denver, Colo. 80220
HS-027 342

NSG-3178
Princeton Univ. Guggenheim Labs., Princeton, N.J.
HS-027 356

PPA-HS027
Calspan Advanced Technology Center, P.O. Box 400, Buffalo, N.Y. 14221
HS-805 224

Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass. 02142
HS-805 220

Ref: DOT-HS-4-00946
Dunlap and Associates, Inc.; National Hwy. Traffic Safety Administration, Washington, D.C. 20590
HS-028 463

Ref: DOT-HS-6-01425
National Hwy. Traffic Safety Administration, 400 7th St., S.W., Washington, D.C. 20590
HS-805 198

Ref: DOT-HS-7-01511
University of Oxford, Dept. of Engineering Science, Oxford, England
HS-028 495

Ref: DOT-HS-8-01819-78
Indiana Univ., Inst. for Res. in Public Safety; Ben Gurion Univ., Dept of Industrial Engineeging, Israel
HS-028 472

blank page

Report Number Index

CED-79-126 HS-027 388

DOE/CS-0093 HS-027 372

DOE/EA-0075 HS-027 375

DOT-TSC-NHTSA-79-47 HS-805 019

DOT-TSC-NHTSA-80-13 HS-805 224

DOT-TSC-NHTSA-80-9 HS-805 220

DOT-TSC-UMTA-77-42 HS-027 411

DOT-TSC-UMTA-78-20 HS-027 410

DOT/RSPA/DPB-50/77/18 HS-027 409

HCP/M2098-01 HS-027 371

LTS-SB2-40-8(a)79-C-137 HS-805 217

NSF/RA-780610 HS-027 342

OR-2 HS-027 395

OR-3 HS-027 394

PB-281 474 HS-027 411

PB-285 234 HS-027 410

PB-286 610 HS-027 409

PB-296 209 HS-027 342

PB80-130 503 HS-805 019

SAE-HS-24 HS-027 393

SAE-SP-447 HS-027 376

SAE-790226 HS-027 374

SAE-790228 HS-027 401

SAE-790304 HS-027 346

SAE-790305 HS-027 347

SAE-790306 HS-027 348

SAE-790307 HS-027 349

SAE-790308 HS-027 350

SAE-790309 HS-027 351

SAE-790310 HS-027 352

SAE-790312 HS-027 353

SAE-790350 HS-027 345

SAE-790354 HS-027 354

SAE-790355 HS-027 355

SAE-790356 HS-027 356

SAE-790359 HS-027 357

SAE-790374 HS-027 358

SAE-790375 HS-027 359

SAE-790680 HS-027 403

SAE-790681 HS-027 404

SAE-790682 HS-027 405

SAE-790684 HS-027 406

SAE-790685 HS-027 407

SAE-790687 HS-027 408

SAE-790866 HS-027 377

SAE-790867 HS-027 378

SAE-790868 HS-027 379

SAE-790869 HS-027 380

SAE-790870	HS-027 381
SAE-790871	HS-027 382
SAE-790872	HS-027 383
SAE-790873	HS-027 384
UC-13,96	HS-027 375
UC-96	HS-027 372
UC-96,97b	HS-027 371
UM-HSRI-79-91	HS-805 219
UMTA-CA-06-0002-78-1	HS-027 410
UMTA-MA-06-0049-77-9	HS-027 411
UR-16	HS-805 231

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U.S. Department of Transportation **National Highway Traffic Safety Administration**

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GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and catalog or stock number.**

Reference copy only: Documents may be examined at the NHTSA Technical Reference Division or borrowed on inter-library loan through your local library.

See publication: Articles in journals, papers in proceedings, or chapters in books are found in the publication cited. These publications may be in libraries or purchased from publishers or dealers.

SAE: Society of Automotive gineers, Dept. HSL, 400 Co monwealth Drive, Warrenda Pa. 15096. Order by title and S report number.

TRB: Transportation Resea Board, National Academy Sciences, 2101 Constitution A N.W., Washington, D.C. 20418.

Corporate author: Inquiries sh be addressed to the organiza listed in the individual citation

ABSTRACT CITATIONS

SAMPLE ENTRIES

FORMAT OF ENTRIES IN HIGHWAY SAFETY LITERATURE

NHTSA accession number ---- HS-013 124

Title of document ---- **MAXIMUM BRAKE PEDAL FORCES PRODUCED B**
MALE AND FEMALE DRIVERS

Abstract ---- The object of this research was to obtain data concerning t
maximum amount of brake pedal force that automobile driv
were able to sustain over a period of ten seconds. Subje
were told to apply the brakes in the test car as they would i
panic stop, and to exert as much force as possible on t
pedal over the entire ten second test period. A total of 84 s
jects were tested, including 42 males and 42 females. T
results indicated that there is a wide distribution of valu
which characterizes the pedal force that the subjects were a
to generate. Male subjects produced generally higher for
than did females. Over half the women tested were unable
exert more than 150 lbs. of force with either foot alone, b
when both feet were applied to the pedal, force levels rose s
nificantly.

Personal author(s) ---- by C. R. VonBuseck
Corporate author (or author's affiliation) ---- General Motors Corp.
Publication date; pagination ---- 1973? ; 18p
Supplementary note ---- Excerpts from Maximum Parking Brake Forces Applied by
Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, a
included.
Availability ---- Availability: Corporate author

NHTSA accession number ---- HS-018 924

Title of document ---- **NATURAL FREQUENCIES OF THE BIAS TIRE**

Abstract ---- The lowest natural frequencies of a bias tire under inflati
pressure are deduced by assuming the bias tire as a compos
structure of a bias-laminated, toroidal membrane shell a
rigorously taking three displacement components into co
sideration. The point collocation method is used to solve
derived system of differential equations with variable coe
cients. It is found that the lowest natural frequencies cal
lated for two kinds of bias tire agree well with the correspo
ing experimental results in a wide range of inflation pressu
Results of the approximate analysis show that the influen
of the in-plane inertia forces on natural frequency may be c
sidered small, but the influences of in-plane displacements
large, particularly on the natural frequency of the tire un
low inflation pressure.

Personal author(s) ---- by Masami Hirano; Takashi Akasaka
Journal citation ---- Publ: Tire Science and Technology v4 n2 p86-114 (May 197
Publication date ---- 1976; 6refs
Availability ---- Availability: See publication

HS-025 657

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.

The manual covers standards for all signs, signals, markings, and devices placed on, over, or adjacent to a street or highway by authority of a public body or official having jurisdiction to regulate, warn, or guide traffic. The material includes general provisions, signs (regulatory; warning; guide signs for conventional roads, expressways, and freeways; and signs for civil defense), markings (pavement and curb, object markers, delineation, colored pavements, and barricades and other channelizing devices), signals (traffic controls, warrants for installation, and pedestrian and other highway signals), and islands (design, approach end treatment, illumination, signs, and markings). Separate sections cover traffic controls for construction and maintenance operations, for school areas, for railroad-highway grade crossings, and for bicycle facilities. This edition of the manual incorporates all revisions which have been approved through official rulings, and continues a trend toward broader use of symbols rather than word messages.

Federal Hwy. Administration, Washington, D.C. 20590
Rept. No. ANSI-D6.1-1978 ; 1978 ; 461p refs
Prepared in cooperation with the National Advisory Com. on Uniform Traffic Control Devices.
Availability: GPO

HS-027 413

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS

An analysis was made of injury-producing accidents involving psychiatric inpatients as drivers which occurred in Denmark during the Jul 1972-Jun 1974 period. Women were overrepresented among these drivers compared to the 1973 accident-involved (injury-producing) driver population in general. A great majority of the drivers in the psychiatric group were in the 25-54 age bracket. About 3% of the patients were involved in two or more accidents during the period studied. More of the patients drove stolen vehicles, did not have valid licenses, and did not use safety belts at the time of the accident than the other accident-involved drivers. Those in the psychiatric group were injured more frequently than the other group of drivers, and were more frequently intoxicated, with higher blood alcohol levels. They were most commonly diagnosed as having either personality disorders or transitory reactions.

by Marianne Kastrup; Annalise Dupont; Mogens Bille; Hans Lund
Publ: Acta Psychiatrica Scandinavica v58 n1 p30-9 (1978)
1979 ; 13refs
Availability: See publication

HS-027 414

EVALUATION OF SAFETY SYMBOLS

The increasing use of symbols to convey fire safety information, and the trend toward international standardization of symbols for transportation and other systems are described. The need for further research on symbols is discussed in terms of their advantages (rapid and accurate communication without the barriers of verbal language) and disadvantages (too rapid proliferation of different symbols and inappropriate or misleading application). The failure to evaluate the comprehensibility of each symbol is cited as a major problem. A case study which illustrates the issues surrounding a proposed set of fire safety symbols is presented. The symbols studied were drawn from the draft standard proposed by the International Standards Organization Technical Com. 21 subcommittee on Fire Safety Symbols. This study, sponsored by the National Fire Prevention Assoc., evaluated 22 fire safety symbols for their accuracy and ability to convey information. Preliminary results show that several of the symbols were accurately understood by the majority of subjects, but others were either not known or were identified with a meaning opposite to that intended. The 22 symbols are illustrated, with notation of the percentage of subjects who responded correctly. A current National Bureau of Standards safety symbol evaluation program is described.

by Belinda L. Collins; Brian C. Pierman
National Bureau of Standards, Environmental Design Res. Div., Washington, D.C. 20234
Rept. No. NBSIR-79-1760; PB-298 175 ; 1979 ; 38p 17refs
Originally prepared for Behavior in Fire Emergencies International Seminar (2nd) Proceedings.
Availability: NTIS

HS-027 415

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT

A literature review (bibliography not included) was conducted of relevant demonstration and operational projects and analytical/model-based evaluations of three types of short-range transportation programs: priority treatment for high-occupancy vehicles on freeways and arterials; areawide carpool and van pool programs; and transit fare reductions and service improvements. Transportation programs which demonstrated potential for cost-effectively improving either localized or regional air quality were selected for detailed analysis. Twenty scenarios (ten local, ten regional) were defined to represent real-world circumstances. The travel, emissions, air quality, energy consumption, economic, and cost impacts for the programs and scenarios were analyzed. The cost-effectiveness of the alternative programs in promoting air quality and reducing vehicular emissions was examined. Important factors (e.g. meterological conditions, traffic volumes and speeds, and changes in modal choice) likely to influence air quality and emissions were considered. The information developed is intended to assist urban areas in developing transportation measures for the State Implementation Plan and integrating their transportation system management and air quality planning programs as required by the Federal Hwy. Administration, Urban Mass Transportation Administration, and Environmental Protection Agency. Appended are analytical assumptions and methodology for non-cost impact estimates and a set of unit cost assumptions.

by John F. DiRenzo; Richard B. Rubin
Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036; Engineering-Science, 7903 Westpark Dr., McLean, Va. 22101
EPA-68-01-3912
Rept. No. EPA-400/2-78-002; PB-282 346 ; 1979 ; 120p refs
Sponsored in cooperation with Dept. of Transportation.
Availability: NTIS

HS-027 416

TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT

The admission status, social and demographic characteristics, and treatment course are described for 359 patients treated in the alcoholism and drug addiction unit at Cherry Farm Hospital, Dunedin, New Zealand, from Mar 1974 to Feb 1977. Persons dependent on alcohol alone, those dependent on drugs other than or in addition to alcohol, and those with mental or physical conditions where drug dependence was a prominent feature were admitted to this unit on an informal or on a compulsory basis. The treatment goal for all patients was abstinence. A sample of 156 of these patients leaving the unit was followed for 12 months to assess treatment outcome. It was found that one year after discharge, 11% of the patients had adopted an abstinent lifestyle while 42% had been rehospitalized. It was found that compulsory enrollment status was not related to outcome status, nor was it related to employment, domicile, marital status, or cultural background. Discharged women were significantly more likely to achieve abstinence than men and less likely to be rehospitalized. No relationship was found between previous treatment and outcome. Some relationship was found between marital status and outcome status for women, but not for men. Strong relationships were determined between both occupational status and insight and the status of outcome. Recommendations from this study include: consideration of a variety of outpatient services which would reduce the need for hospital admissions and re-admission for both compulsory and informal patients; use of a number of individually formulated goals vs. use of abstinence as the only specified goal, and incorporation of an evaluation process as an integral part of any treatment program.

by Mary Anderson
Publ: New Zealand Medical Journal v88 n620 p233-7 (27 Sep 1978)
1978 ; 20refs
Sponsored by War Pensions Medical Res. Trust (New Zealand).
Availability: See publication

HS-027 417

EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA

A 33-year-old man suffered ocular trauma as the result of an automobile battery explosion. The subject was checking the level of the battery acid using a lighted match as a source of illumination when the battery exploded. The central corneal epithelium was peeled back to the limbus in both of the patient's eyes. There was a 3 mm laceration of the nasal bulbar conjunctiva of the right eye. On ophthalmoscopy, macular edema; subretinal, preretinal, and vitreous hemorrhages; and a choroidal rupture were seen in the right eye. During hospitalization, an area of stromal edema developed in the right cornea. Both corneas subsequently re-epithelialized. Six weeks after the accident the hemorrhages were slowly resorbing. A hole had developed in the macular area of the eye over an area of subretinal hemorrhage. Conjunctival laceration and choroidal rupture seen in another case resulted in the rupture of the globe and subsequent loss of the eye. According to evidence, most ocular injuries caused by battery explosions occur when a person uses an open flame to check the battery acid level. Theoretically, such explosions can occur only if a recent discharge of the battery (as occurs when starting a car) has initiated release of hydrogen gas. Internal sparking and improper use of jumper cables can also ignite hydrogen gas, causing battery explosions.

by Robert D. Williams; Rise D. Ochsner; Peter H. Morse
Publ: Louisiana State Medical Society Journal v130 n9 p179-8
(Sep 1978)
1978 ; 2refs
Availability: See publication

HS-027 418

THE $200 MILLION CAR

John Z. DeLorean, a former executive with General Moto
has established his own company to produce a two-seat spo
car tentatively named the DMC-12. By the beginning of 198
the DMC-12 is scheduled to roll off a Northern Ireland asse
bly line. The car will be in the Corvette-Porsche 924 pri
range of $14,000, and features a stainless steel skin which
expected to last at least 25 years without rust. The body chas
is made of a new molding process with glass fiber and ureth
foam saturated with resin. The chassis is light but strong, with
front design aimed at providing occupant protection in 80 m
crashes. The DMC-12's gull-wing doors are regarded as saf
than conventional ones because they are not jarred open
easily. Mileage is expected to be 32 mpg highway and 28 m
city; acceleration is projected to be 0 to 60 mph in less th
eight sec. Except for the chassis, DeLorean's company will
little manufacturing. The V-6 engines are being obtained fro
Renault, air conditioning from General Motors, and tires fro
either Pirelli or Goodyear. The limited options include automa
ic or five-speed transmission and choice of interior color. Th
greatest obstacle in producing the car proved to be financin
but DeLorean was able to obtain $200 million from vario
investors and $120 million in development grants from the go
ernment of Northern Ireland. By the end of 1979, a network
400 dealerships for the DMC-12 is expected (located mostly
California and Texas, and involving General Motors dealers
By 1982, the company expects to produce 30,000 cars per ye
and to employ 2000 workers.

by Barry Stavro
Publ: New York Times Magazine p44-8, 50, 55, 60 (28 Oct 1979)
1979
Oversized pages.
Availability: See publication

HS-027 419

A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT

A three-phase study was conducted to evaluate and improve t
crashworthiness of several classes of passenger-carrying rail v
hicles. Phase 1 surveyed the train-to-train accident data fro
1966 through 1973, identified the principal factors in cras
worthiness and personal injury, prioritized the vehicles f
study, and defined candidate improvements in terms of co
benefit. A detailed analysis of the structural integrity of a co
muter car (the St. Louis Car Co., ICG Highliner) was p
formed. Phase 2 extended the structural analysis to the caboo
(International Car Co., Bay Window Caboose) and the locom
tive (Electromotive Div. of General Motors, GP-40 mode
Phase 3 developed a potential design for a structurally cras
worthy locomotive cab (the locomotive having been found
be the most lethal vehicle). This design treats a deflection shie
system suitable for concept validation testing, and throu
mathematical modeling it provides both static and dynamic an
yses to assist in the detail specifications of the required str
tures. Recommendations from this study include: further dev

opment of analytical tools for collision dynamics and structure behavior in crashes and application to design evaluation; development of crashworthy components (e.g. couplers, anticlimbers, collision posts, and truck retention devices); static and dynamic testing of vehicle classes to determine failure modes; establishment of specifications and standards for crash-resistant welds for structural elements; development of procedures for obtaining impact-resistant steel structural shapes; and installation and validation testing of the deflection shield system on a locomotive.

by Edward Widmayer
Boeing Vertol Co., P.O. Box 16858, Philadelphia, Pa. 19142
DOT-TSC-856
Rept. No. FRA/ORD-79-13; DOT-TSC-FRA-79-13 ; 1979 ; 125p 23refs
Rept. for Jun 1974-Dec 1977.
Availability: NTIS

HS-027 420

LEGAL BUT LETHAL (BRITISH TIRE LAWS)

The Firestone Tyre and Rubber Co. (U.K.) advocates a change in the Motor Vehicles (Construction and Use) Regulation regarding tire tread depth. According to the law, a tire can be considered illegal if it does not have a tread depth of at least 1 mm throughout at least three-quarters of the breadth of the tread and around the entire outer circumference. Firestone considers this requirement not only inadequate but difficult to interpret. There remain the questions of where tread begins and ends on a radial tire, and whether the three-quarters breadth measurement needs to be uninterrupted across the arc of the tread. A modification of the regulation is recommended to require a minimum 1.59 mm of pattern depth across 100% of the tread. Firestone also acknowledges the need for an increased effort by the tire industry to convince motorists that worn tires are very dangerous.

by Peter Taylor
Publ: On The Road v2 n3 p4-6 (Autumn 1979)
1979
Availability: See publication

HS-027 421

CARS AND ROADS: UP-TO-DATE OR OBSOLETE?

The opinion is advanced that the car and the roadway of today are obsolete and need rethinking and redesigning. The automobile was developed by Henry Ford as a means for farmers to travel to market and to escape the isolation of the country and was never intended for city streets. Cars today are used mainly on 30 mph urban streets, where pedestrians abound. Just as cars are not designed for in-town travel, city streets are not designed to be shared by people and vehicles. Walking is an overwhelmingly important form of transport and a key element in the economy of the cities. About two out of five trips in Britain are made on foot. Two out of three children walk to school and one out of five adults walks to work. Yet the pedestrian has been neglected by policy makers; the failure to create safe and convenient conditions for pedestrians is expressed in road casualty figures. In Britain in 1977, 35% of the road fatalities involved pedestrians. The aim of the Pedestrians Assoc. (Great Britain) is to reshape the car and the roadway to make them compatible with pedestrian safety and comfort.

by Terence Bendixson
Publ: On The Road v2 n3 p19-21 (Autumn 1979)
1979
Availability: See publication

HS-027 422

THE DIFFICULT AGE (SAFETY RESTRAINTS FOR CHILDREN)

Research was carried out by Dr. Bertil Aldman, Professor of Traffic Safety at Chalmers Univ., Goteborg, Sweden, on child injuries and the use of safety belts. Dr. Aldman considered how physical growth influences the behavior of the child's body during a car accident. His studies, conducted on behalf of Volvo, concluded that one type of protective system for all children is not possible. Any system should prevent the child from being flung about in the car, and preferably should make use of the energy-absorbing properties of the car structure. Volvo's recommendations for child occupant protection are presented. For children up to the age of nine months, the carry cot and safety bench are suggested. For ages ten months through six years of age, a rearward-facing child restraint seat is recommended, and for ages seven through ten years, a seat belt cushion anchored to the back seat by available seat belts.

Publ: On The Road v2 n3 p22-4 (Autumn 1979)
1979
Availability: See publication

HS-027 423

DIESEL ENGINE THERMAL LOADING

Twelve papers are compiled from the SAE off-highway vehicle meeting in Milwaukee, 10-13 Sep 1979. The papers cover a wide range of subjects in the general area of diesel engine heat transfer and thermal loading. Topics are as follows: Norwegian research on thermal loading of diesel engines; strength analysis of thermally loaded engine components by two- and three-dimensional finite element models; prediction of thermal loading of supercharged diesel engines; effect of partial suppression of heat loss to coolant on the high-output diesel engine cycle; matching calculations for turbocharged and compound engines with reduced heat loss; advanced approaches for heat transfer calculations; heat transfer in the indirect injection diesel engine; instantaneous heat transfer in the cylinder of a high-speed diesel engine; determination of local heat transfer coefficients at the piston of a high-speed diesel engine by evaluation of measured temperature distribution; design and fatigue life of pistons for high brake mean effective pressure diesel engines; new design features, analytical methods, and research and development programs for diesel pistons; and use of photoelasticity in the analysis of engine components.

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-449 ; 1979 ; 150p refs
Includes HS-027 424--HS-027 435.
Availability: SAE

HS-027 424

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY

Background is provided on Norwegian research in the field of thermal loading of large and medium speed diesel engines. Current research activities and typical results are discussed. Instrumentation employed in this research is described, with emphasis on sensors used in combustion chamber heat transfer studies. The use of minicomputers for data acquisition, processing, and presentation is discussed, as well as finite element analysis of temperature fields and heat transfer. Current research projects involve process modeling, electronic fuel injection, thermal-insulating coatings on engine components, combustion characteristics of heavy fuels, and thermal loading of medium-speed diesel engines. Supporting illustrations, graphs, and references are included.

by Arthur Sarsten
Norwegian Inst. of Tech., Div. of Combustion Engines and Marine Engineering, Trondheim, Norway
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p1-17
Rept. No. SAE-790819 ; 1979 ; 20refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Research sponsored in large part by Norwegian Council for Scientific and Industrial Res. (NTNF).
Availability: In HS-027 423

HS-027 425

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS

Design analyses of thermally loaded engine components by two- rather than three-dimensional finite element models can reduce costs by at least an order of magnitude, although in some cases the significance of the results is also diminished or even lost. The effects of such simplifications are discussed using a diesel engine piston and a radial turbine wheel as examples. Temperature distributions can be computed with good accuracy using simplified models and engineering judgment. The results of stress analyses are much more uncertain. Even widely accepted idealizations can produce results which are directly misleading. Appended are descriptions of the fundamental considerations underlying the finite element programs as well as supporting illustrations.

by O. T. Saugerud; N. Sandsmark
Det Norske Veritas, Res. Div., Oslo, Norway
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p19-31
Rept. No. SAE-790820 ; 1979 ; 10refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 423

HS-027 426

PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES

Experimental investigations were carried out on a high-speed diesel engine. Heat fluxes to the piston, cylinder head, and liner were separately determined by evaluating heat balances and measured steady-state temperature fields. The experimental results were compared with those of the following cycle simulations using an equation for the local mean heat transfer coefficient (Woschni (1967), SAE-670931): flux from the working fluid to the component, heat from the working fluid to the component, and heat transfer at the cooled side of the component. It was found that this equation can be used for predicting the heat losses to the cylinder walls as well as the steady-state temperature fields of the components.

by Gerhard Woschni
Technische Universitat Munchen, Munich, Federal Republic of Germany
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p33-41
Rept. No. SAE-790821 ; 1979 ; 11refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Research sponsored by Forschungsvereinigung Verbrennungskraftmaschinen and Arbeitsgemeinschaft Industrieller Forschungsvereinigungen.
Availability: In HS-027 423

HS-027 427

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE

The effect of partial cylinder insulation was analyzed for a high-output diesel engine (Perkins 6.354 six-cylinder four-cycle) using the diesel cycle simulation program for three conditions: "normal" cylinder walls; walls with a uniformly distributed layer of silicon nitride, giving approximately isothermal conditions; and adiabatic wall conditions. For the case of the silicon nitride coatings, it was found that heat loss to the coolant can be reduced by approximately 50%. Isothermal operation of the engine brings about little improvement in indicated thermal efficiency, the reduced heat loss to coolant being largely transferred to increased exhaust enthalpy. The benefit of increased exhaust enthalpy can be fully realized only by turbocompounding. Adiabatic operation provides marked improvement in cycle efficiency as well as raised exhaust enthalpy. The requirement for fully adiabatic operation presents great practical difficulties in terms of materials and methods of construction.

by F. J. Wallace; R. J. B. Way; H. Vollmert
University of Bath, School of Engineering, England
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p43-52
Rept. No. SAE-790823 ; 1979 ; 5refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Research sponsored by Wolfson Foundation of Great Britain. See also HS-027 428.
Availability: In HS-027 423

HS-027 428

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS

Matching analysis results are presented showing the effect of reduced heat loss on the interaction between a diesel engine and turbomachinery components. The engine used is the Perkins 6.354 six-cylinder with low compression ratio pistons. Results are given for a speed range between 1000 and 2500 rpm for both simple turbocharged and turbocharged compound engines with normal heat loss and with 50% heat suppression. The use of turbocompounding increases thermal efficiency by 2% to 3%. Compounding significantly improves the matching of the turbocharger by enabling a smaller turbine to be fitted, with improved air-fuel ratio, higher efficiency and less smoke at low engine speeds. Suppression of heat loss alone (realistic case) yields a 1% improvement in efficiency. On the other hand, true adiabatic operation would result in much larger gains (8% to 10%), particularly at low speeds. Alternative forms of compounding, such as the use of variable geometry turbines and split power arrangements, merit serious consideration.

by R. J. B. Way; F. J. Wallace
University of Bath, School of Engineering, England
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p53-9
Rept. No. SAE-790824 ; 1979 ; 6refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. See also HS-027 427.
Availability: In HS-027 423

HS-027 429

ADVANCED APPROACHES FOR HEAT TRANSFER CALCULATIONS

Three advanced measuring techniques (and results of their application) for heat transfer in diesel engines are described: the surface temperature method, the heat flux probe application, and the combustion chamber pressure measurement method. Using results of experiments which applied these procedures, an improved heat transfer calculation method was developed. A comparison between measured and computed results showed that the equation defines heat transfer with sufficient accuracy for all engine operating conditions. The heat transfer equation is relatively simple and applies to high-pressure and charge cycle conditions. Information is supplied on the local mean heat transfer; further studies are necessary to determine the reasons for local differences (induced air motion or combustion), so that analogous computations can be made.

by Gunter F. Hohenberg
Daimler-Benz A.G., Res. and Devel., Federal Republic of Germany
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p61-79
Rept. No. SAE-790825 ; 1979 ; 22refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 423

HS-027 430

HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE

A method is presented for predicting instantaneous heat transfer between the working fluid of an indirect injection diesel engine and pre- and main-chamber surfaces. The correlation is proposed for both motored and fired engine operation and is supported by experimental data. The model is based on the conventional Nusselt-Reynolds number relationship for the convective component, but uses a novel approach for the local characteristic velocity component. Under fired conditions, velocity enhancement is included, together with a radiation model. An experimental program of instantaneous heat flux measurement in the pre- and main-chamber is described which covers a wide range of operating conditions, both motored and fired. Comparisons of measured and predicted heat fluxes in both chambers are provided. Mean values of pre- and main-chamber surface temperature, and connecting passage wall temperatures are included.

by M. Kamel; N. Watson
Imperial Coll. of Science and Technology, Dept. of Mechanical Engineering, London SW7 2BX, England
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p81-94
Rept. No. SAE-790826 ; 1979 ; 17refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 423

HS-027 431

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE

Measurements of instantaneous surface temperature variations were made at five positions on the combustion chamber side of the cylinder head in an externally supercharged, single-cylinder, four-stroke, high-speed diesel engine. Local instantaneous heat flux into the combustion chamber wall was calculated from the measured time curves of the local surface temperatures. It is assumed that the thermal conductivity of the material and a second temperature are known, and that the temperature field in the wall is one-dimensional. The total heat flux consists of a steady-state and a fluctuating component. The steady-state component requires the assumption of one dimensionality, whereas the fluctuating component does not. Since a one-dimensional temperature field in the wall cannot be realized, the measured steady-state component has to be corrected. A convenient correction method is described, and measured local and local mean heat transfer coefficient variations are presented, as well as variations calculated using Woschni's equation (1967, SAE-670931). Agreement is good between measured and calculated results for the high-pressure phase of the cycle.

by K. Sihling; Gerhard Woschni
Daimler-Benz A.G., Federal Republic of Germany; Technische Universitat Munchen, Munich, Federal Republic of Germany
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p95-103
Rept. No. SAE-790833 ; 1979 ; 15refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Research sponsored by Forschungsvereinigung Verbrennungskraftmaschinen and Arbeitsgemeinschaft Industrieller Forschungsvereinigungen.
Availability: In HS-027 423

HS-027 432

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION

More than 60 temperature distributions in a piston of a high-speed diesel engine were determined from measured temperatures at 20 discrete points of the piston for varied engine operating conditions and different cooling conditions. They were evaluated to determine the heat flux through the piston and the heat transfer coefficients at the boundaries. The results obtained are mutually conclusive and show that the heat flow from the working fluid to the piston for different engine operating conditions can be determined by a combined application of the cycle simulation and the electrolytic tank analog. The heat transfer coefficients at the cooled side of the piston are important for predicting the thermal loading of engine components.

by Gerhard Woschni; Johann Fieger
Technische Universitat Munchen, Munich, Federal Republic of Germany
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p105-13
Rept. No. SAE-790834 ; 1979 ; 9refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Research sponsored by Forschungsvereinigung Verbrennungskraftmaschinen, and Arbeitsgemeinschaft Industrieller Forschungsvereinigungen.
Availability: In HS-027 423 era

HS-027 433

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES

Anticipating an increase in the mean effective pressures (mep) of turbocharged diesel engines, designers expect that the standard cast aluminum piston with ring carrier, uncooled or splash-cooled, may become subjected to critical stress levels. The piston loading limit varies from 10 to a maximum of 14 bar mep. Before changing to alternative design principles, the load-bearing capacity of the aluminum piston could be improved by hard anodizing the crown, employing an internal cooling system, and also by roller burnishing the pin bore, using an inclined boss design or profile ground piston pin. The load limit could thus be extended to a range of 12 to 17 bar mep. Currently, nodular cast iron pistons in "monobloc" design have successfully been introduced at ratings of 16 to 22 bar mep. An upper limit of this piston design has not been defined. Results are presented of three-dimensional finite element analyses of the aluminum and cast iron piston structures.

by W. Sander; S. Schoeckle
Karl Schmidt G.m.b.H., Federal Republic of Germany
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p115-29
Rept. No. SAE-790857 ; 1979 ; 10refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 423

HS-027 434

SOME DIESEL PISTON FEATURES IN DESIGN ANALYSIS AND EXPERIMENT

A general view is presented of the state of the art of high-speed diesel engine piston design practice. Selective consideration is given to new features, analytical techniques, and research programs. Four computer-assisted predictive practices which are currently being successfully applied to piston development are described: cycle simulation, finite element analysis, transverse piston movement analysis, and cooling oil flow prediction. The application of these predictive methods has proved effective in solving problems, reducing development time and cost, and generally supporting cost-effective design. A better understanding of the ring pack sealing process is needed for the optimization of such factors as oil control, blowby, emissions, fuel consumption, and carbon deposit formation. Subjects important in current piston development activities are examined in some detail, with reference made to predictive methods and experimental programs. These areas include: oil cooling, crown cracking, close clearance designs, and land/groove features.

by Robert Munro
Wellworthy Ltd.
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p131-43
Rept. No. SAE-790858 ; 1979 ; 7refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 423

HS-027 435

INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY

The application of photoelasticity to stress and deformation analysis of engine components is discussed, including four examples of the application of the two-dimensional photoel method: composite pistons, cooling-channel pistons, piston circlips, and crankshaft. Application of the three-dimensi photoelastic method includes diesel pistons for commercial v cles, composite pistons, nodular cast iron pistons, connec rods, shrinkage stresses in piston material due to cast iron st and piston pins with transverse bores. The two photoel methods are compared and they, in turn, are compared with finite element analysis method. The photoelastic surface l method, which can be applied in both static and dynamic in tigations of component stress, is described and two exan applications outlined (filter housing, engine block).

by Manfred D. Roehrle
MAHLE G.m.b.H., Federal Republic of Germany
Publ: HS-027 423 (SAE-SP-449), "Diesel Engine Thermal Loading," Warrendale, Pa., 1979 p145-54
Rept. No. SAE-790859 ; 1979 ; 4refs
Presented at the SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 423

HS-027 436

GASOHOL CONSUMPTION SKYROCKETS. TRY LITTLE "WHITE LIGHTNING" IN YOUR TANK

The current increase in gasohol use is primarily the result two factors, the skyrocketing cost of petroleum and recent g surpluses, particularly in corn-producing states. Factors rela to gasohol's popularity include driver-perceived improvemen automobile performance. Gasohol has a higher octane than leaded regular gasoline, resulting in reduced engine knock; cheaper than premium unleaded gasoline; and is a vehicle derived from renewable agricultural products. Extensive on the performance of a wide range of vehicles have indica no major problems with gasohol use. Three alcohol produ plan to expand or are expanding their facilities for eth production to accommodate the demand for gasohol. There been controversy over using 190- and 193-proof ethanol (w contains 5% water by volume) for gasoline blends becaus possible phase separation problems. This issue will become n when a new technology is used which can produce anhyd ethanol at relatively low cost from both 190- and 193-p ethanol. No food/fuel conflict is expected; in most instan alcohol is and will continue to be a co-product of food-pro tion processes. The use of methanol in blending gasohol is seen as economically feasible. A General Motors (GM) Labs. fuels expert says that gasohol has about 3% less en than gasoline, but if an engine were designed to run on alcohol, increased mpg could be achieved. According to the production of ethanol consumes more energy than is av ble in the alcohol it produces. The Dept. of Energy rema strong proponent of gasohol, while the auto industry sup coal and oil shale exploitation to meet fuel needs.

by Clare E. Wise
Publ: Machine Design v51 n24 p28-30, 32-3 (25 Oct 1979)
1979
Availability: See publication

HS-027 437

THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS

Electronic engine controls (EEC) are becoming more sop cated in an effort to maintain a stoichiometric balance be stricter fuel economy and emission standards for optimun ciency. An emerging EEC trend is the switch from analog to digital microprocessors. With an electronic control unit on board, electronic fuel injection (EFI) is a natural addition. Ford's EFI system replaces the carburetor on the 5.0 L engine in certain applications. This system is controlled by the EEC III (digital) which controls fuel discharge very precisely; combined with high fuel pressure, the fuel distribution to each cylinder is better than that achieved by a carburetor. This enables the engine to meet the stricter emission standards while retaining good driveability. Cadillac's EFI, also a throttle body system, uses a digital microprocessor which monitors fuel flow, spark advance, and manifold absolute pressure. The microprocessor limits idle speed to 500 rpm at all loads, and performs various diagnostic functions. With Chrysler's electronic feedback carburetor system, sensors in the exhaust manifold monitor oxygen content in the exhaust and relay that information to the computer. The computer adjusts the air-fuel mixture to maintain stoichiometry. The feedback carburetor is also used with an air pump and three-way catalyst to control emissions. For meeting California emission standards and for high altitude use, Chrysler has added a detonation suppressor system, in which sensors on the intake manifold monitor engine vibration levels and adjust the spark timing in response.

by John McElroy
Publ: Automotive Industries v159 n10 p105-7 (Oct 1979)
1979
Availability: See publication

HS-027 438

CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES

Previous economic research on automobile demand is reviewed and examined in terms of the response of consumers to fuel-efficient vehicles. Three categories of research are reviewed: aggregate and disaggregate econometric studies, and hedonic price analyses. It is shown that the fundamental problems encountered in all of the previous research were insufficient variation and too large covariation among automobile characteristics (e.g. price, weight, and length). Two methods to alleviate these problems are proposed for future research: a disaggregate model estimated with a large number of automobile alternatives (each make, model, and year) and no (or few) alternative-specific constants; and various experimental methods, such as conjoint analysis, to elicit consumers' values of various automobile characteristics.

by Kenneth Train
Publ: Transportation v8 n3 p237-58 (Sep 1979)
1979 ; 50refs
Availability: See publication

HS-027 439

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM

A computerizable classification for identifying car and truck paint was developed from data on 10,000 paint samples as well as information from manufacturers and paint vendors. Data were obtained from police traffic divisions in Alberta, Canada, for 1960-1977 North American and imported cars and trucks involved in accidents in Alberta over a 7-month period. A manual data retrieval system was designed to correlate microscopic and chemical information obtained from paint chip examinations and manufacturer information. Extensive codes and abbreviations were devised to collect, file, and correlate data from the 10,000 samples so that each information item could be independently and rapidly retrieved. Information items included vehicle line/series, years, assembly plants, and partial vehicle identification numbers for identifying hit-and-run vehicles. Industrial standardized conditions were used for microscopic comparisons of chromatic and geometric appearances. Infrared analysis was employed to investigate original topcoat and undercoat layers from secondary undercoat standards. After chemical analysis was complete, secondary undercoat standards were microscopically compared to correlate data from all assembly plants and model years. Each undercoat layer was color-coded and recorded in master files to facilitate access to data banks via computer. While paint samples were sorted into a set of working standards, it became obvious that surface geometric attributes played a major role in identifying and comparing samples (paint samples from the same model year and assembly plant exhibited wide variations in gloss and texture).

by R. J. Audette; R. F. E. Percy
Publ: Journal of Forensic Sciences v24 n4 p790-807 (Oct 1979)
1979 ; 36refs
Availability: See publication

HS-027 440

AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES

Variations in state gasoline consumption rates per household and per vehicle are explained. The analysis assumes that the gasoline demand equation is the same for all states, and the Least Squares Dummy Variable (LSDV) approach is used to deal with time series (1966-1975) cross-sectional state data. The LSDV technique introduces a dummy variable for each cross-sectional unit except one which serves as a reference state. Regression analysis findings concern vehicle miles of travel, fuel intensity, gasoline exports, and agricultural gasoline use. A series of gasoline consumption rates is documented, ranging from a low of 588.7 gallons per vehicle (Pennsylvania) and 864.5 gallons per household (New York) to 900 gallons per vehicle (Arkansas) and 2,222 gallons per household (Wyoming). State household gasoline consumption rates are negatively related to population density, urbanization, agricultural employment, severe winter weather, and small car share of the vehicle fleet. Rates are positively related to the working age population and tourist activity level. Important differences in state gasoline use are not attributable to vehicle ownership, rate of licensed drivers, household size, differences in fuel price or income, and the truck-auto fleet mix. It appears that state consumption rates are caused by complex interactions among environmental, demographic, and economic factors.

by David L. Greene; T. Patrick O'Connor
Oak Ridge National Lab., Oak Ridge, Tenn. 37830
W-7405-eng-26
Rept. No. ORNL-5391 ; 1978 ; 55p refs
On cover: Transportation Energy Program: Monograph Series.
Availability: NTIS

HS-027 441

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS

A study was undertaken to determine causes of divergences among published energy intensity values of selected transportation modes and to prepare a set of consistent values. The focus is on passenger movement by air, automobile, bus, and rail. Federal Hwy. Administration estimates of automobile energy intensity are based on state estimates of vehicle miles traveled, which may contain substatial errors. Environmental Protection Agency (EPA) certification tests have been diverging more each year from actual on-road fuel economy. In studies undertaken to quantify divergences and to determine their causes, a series of regression equations was developed that may be used to correct EPA values in relation to on-road performance. These equations yield correction factors of 0.5, 1.3, 2.3, and 3.5 mpg for model year 1974-1977 cars, respectively, for the EPA sales-weighted fuel economy. With this information and other related data, one can estimate automobile energy intensities for both urban and intercity driving environments. Much information is available about the disaggregate influence of operational and engineering parameters on automotive fuel economy: a 10% change in gross vehicle weight results in a 4% change in fuel economy with all other factors unchanged; a 10% reduction in aerodynamic drag yields a 2-3% improvement in fuel economy; necessary engine maintenance yields close to a 5% improvement in fuel economy; and short trip lengths are associated with severe fuel economy penalities due to insufficiet engine warm-up. Buses combine the auto's flexibility with inherent efficiencies of operating larger capacity vehicles, with intercity buses being the most energy-efficient transportation mode available. The effect of speed on energy consumption varies with terrain (flat, rolling, hilly). A consistent time series of operational data and energy intensity values is presented for each transportation mode.

by Axel B. Rose
Oak Ridge National Lab., Oak Ridge, Tenn. 37830
W-7405-eng-26
Rept. No. ORNL-5506 ; 1979 ; 147p refs
Availability: NTIS

HS-027 442

COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC

Various references are cited to illustrate the diversity in opinion regarding the extent to which drivers with color vision defects, especially protanopia, are a traffic safety hazard. Some proposals which have been made are considered inadequate to make the traffic color code system safer for these drivers. These proposals include use of a red-green-blue color code, doubling the green signal, use of flashing red lights, use of triangular and square diaphragms in traffic lights, and use of green or blue brake lights. Possibly more effective solutions include all visibility and conspicuity improvements of road safety targets (e.g. bigger and more intense traffic lights), greater diameter of the red traffic light, and green lights close to the blue boundary. It is mentioned that visual perception of color-defective drivers can be further impaired by absorbent glasses (sunglasses, tinted contact lenses, and tinted windshields). It is stated that acquired color vision defects not detected by usual color vision tests, and the influence of noise, hypoxemia, and fatigue on normal and defective color vision are only of secondary importance in road traffic safety. A research project sponsored by the Austrian government is described which will test 100 normal and 100 color-defective subjects by a detailed ophthalmological exa
tion, and by a psychological test to determine to what e
color vision defects affect traffic safety. Police records of
dents caused by drivers with color vision defects will be
lyzed, and a field study will compare the driving behavi
drivers with color vision defects (protanomals, protanopes,
teranomals, and deuteranopes) to that of drivers with no
vision.

by O. Neubauer; S. Harrer; M. Marre; G. Verriest
Publ: Modern Problems in Ophthalmology v19 p77-81 (197
1978 ; 33refs
At head of title: Practical Aspects of Colour Vision Deficiencies.
Availability: See publication

HS-027 443

SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?

From a sub-sample of 318 Monroe County, N.Y. househ
interviewed by telephone in 1969 (basic sample 514 fami
information on about 150 families was examined to investi
the relationship between child restraint use and demogra
characteristics and exposure to stress. It is believed that i
mation of this type would delimit a target population at risk
would indicate the type of public education most likely t
effective. Mother's age was found to be related to restraint
only by children under age ten; the absence of any relation
for mothers of children age 11 and older suggests a decli
influence of the parent on this aspect of child behavior.
children under the age of six, the older the mother was, the
likely she was to use a child restraint. Reported non-use
restraints were also found most often to be less educated
have a lower income, and to be Catholic. Use was also fou
be less among those subjected to a high degree of stress (
term, such as chronic illness or unemployment, and short-
such as "upsetting events").

by I. Barry Pless; K. J. Roghmann
PHS-HS-00467
Publ: Canadian Journal of Public Health v69 p289-92 (Jul-A
1978)
1978 ; 9refs
At head of title: Health Topics. Includes French summary.
Availability: See publication

HS-027 444

ROAD ACCIDENTS: ARE DRUGS OTHER THAN ALCOHOL A HAZARD?

It is pointed out that the effects of drugs other than alcoh
driving behavior are more difficult to determine because
metabolism is more complex, the blood concentration ten
be less directly related to their effects, and responses m
more idiosyncratic. Various survey studies in the U.S., Ca
and U.K. are reported which investigated the relationshi
tween the use of various prescribed drugs (taken with or
out alcohol) and traffic accidents, and the extent of drug (
cation) use among the driver population. Although many p
will be safer driving with than without medication, even a
drug effect may be hazardous in a tricky situation. B
having doctors inform their patients of regular and a
effects and interactions of the drugs they prescribe, it is r
mended that posters on drug effects should be used in ho
and health centers, that the media educate the public on
risks, and that drug containers be labeled accordingly

accident risk of marijuana use, and the increasing problem of multiple drug abuse are noted.

Publ: British Medical Journal v2 n6149 p1415-7 (Nov 1978)
1978 ; 11refs
At head of title: A Modern Epidemic.
Availability: See publication

HS-027 445

A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976

Epidemiological factors and injury patterns with respect to helmet use are reported for the 30 motorcycle fatalities which occurred during 1975-1976 in Rhode Island. The state repealed its mandatory helmet use law in Jun 1976. It appears that the annual number of motorcycle fatalities in the state is rising, but further studies are needed to determine the fatality rate increase. The vast majority of victims were white males in their mid-twenties. More than half of the victims were not licensed to operate a motorcycle. Although statistics for these two years indicate that reduced helmet usage was accompanied by a reduced incidence of head/neck trauma among fatalities, a cause-and-effect relationship does not necessarily exist. It is emphasized that data derived from survivors of motorcycle accidents may yield more specific information concerning the safety effects of helmet use, and would supply useful data regarding the "helmet debate". An addendum notes that during 1977 compared to the previous two years, there was an increase in total fatalities, a decrease in operators wearing helmets, but a similar number dying from head trauma. There was a decrease in alcohol use, but no change in other drug use.

by John M. Losee; William Q. Sturner
Publ: Rhode Island Medical Journal v61 n9 p333-40 (Sep 1978)
1978 ; 14refs
Availability: See publication

HS-027 446

SPINAL CORD INJURIES AS A RESULT OF MOTORCYCLE ACCIDENTS

Twenty-one clinical cases are reported of spinal cord injuries (orthopedic and neurological) sustained in motorcycle accidents. The cases were admitted to the Spinal Cord Injury Centre at the Conradie Hosp., Pinelands, South Africa, between 1963 and 1977. These cases represented 3% of such injury cases resulting from motor vehicle accidents which were admitted to the hospital during that period. This type of injury has increased in the area since 1973; it is most common among 15- to 20-year-olds, and is sustained mostly during the summer months. The upper thoracic spine is the most common injury site, maximally involving the sixth thoracic vertebra. The motorcyclist usually sustained this type of injury when he was thrown from his bike, landing on his head or the upper part of his back. The thoracic vertebral injuries were equally distributed between compression fractures and fracture-dislocations. Seventy-five percent involved more than one thoracic vertebral level. The majority (81%) of the neurological injuries of the thoracic spinal cord and 61% of the cervical spinal cord injuries were complete. Wearing of standardized crash helmets became compulsory in 1973, resulting in a decreased mortality due to associated head injuries, and in an increasing percentage of spinal injuries.

by R. D. Shrosbree
Publ: Paraplegia v16 n1 p102-12 (May 1978)
1978 ; 11refs
Includes French and German summaries. Prepared for annual scientific meeting, 1977.
Availability: See publication

HS-027 447

CAUSES AND PREVENTION OF ROAD ACCIDENTS

From the perspective of the British experience, especially in the Gwent area of England, the causes, characteristics, and prevention of traffic accidents are outlined. The influence of driver age, sex, and driving experience on accident susceptibility is considered, as well as the effect of the physical and mental condition of the driver. The reduced impact of the breathalyzer test introduced in Britain in 1967 (the legal blood alcohol level limit being 80 mg/100 ml) is noted, as well as the effect of many drugs besides powerful narcotics on driving ability (e.g. cough syrups or insulin). Accident cases are cited which were caused by momentary distractions of drivers or pedestrians. The characteristics of pedestrian accidents involving adults are compared with those involving children; particular mention is made of child pedestrian accidents involving ice cream trucks, and accidents at pedestrian crosswalks. Other accident factors are outlined, such as vehicle ownership, road unfamiliarity, journey type, seat belt use, and lighting. The traffic safety activities of the Royal Society for the Prevention of Accidents, the police (Gwent Constabulary), and the Dept. of the Environment are described. The effects of a traffic jam on a driver's blood pressure and pulse rate are shown. It is concluded that accident prevention requires a reduction in problems presented by the environment and an improvement of the road user's ability to cope (reduction in human error).

by Priscilla Hopkins
Publ: Nursing Times v74 p1594-6 (28 Sep 1978)
1978
Availability: See publication

HS-027 448

A GUIDE TO REPORTING HIGHWAY STATISTICS

Procedures are outlined for use by the states in the compilation, analysis, and reporting (to the Federal Hwy. Administration (FHWA)) of two categories of data: state motor fuel, motor vehicle, and driver license data; and highway finance data of state and local governments. Detailed instructions are provided for the preparation and submission of annual reporting forms to account for fuel consumption, vehicle registrations, driver licensing, and motor carrier taxation; and the source, distribution, and expenditures of highway funds. The major reporting forms are cross-referenced to the chapters that discuss them. This guide, together with its companion volume, is intended to explain the rationale and procedures involved in the national reporting system for highway statistics.

Federal Hwy. Administration, Hwy. Statistics Div.,
Washington, D.C. 20590
1979 ; 156p 3refs
Companion vol. to "Guide for Reporting Roadway, Travel, and Accident Data."
Availability: Corporate author

HS-027 449

EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO

The background of the mandatory seat belt use law and the highway speed limit reduction in Ontario, Canada is reviewed, and some statistics are presented to demonstrate the positive effect of this legislation on highway safety. On 1 Jan 1976, Ontario enacted a law requiring the wearing of seat belts by all drivers and passengers, with the exception of children under five years of age, people with medical problems, and people whose work requires them to get in and out of a motor vehicle frequently and whose vehicle travels at a speed not exceeding 40 kph. Highway speed limits were reduced in Feb 1976: previous 70 mph limits (110 kph) were changed to 60 mph (100 kph) and 60 mph limits to 50 mph (80 kph), to 55 mph (90 kph), or left unchanged. Data were compiled on patients treated at selected hospitals in Ontario for injuries sustained in motor vehicle accidents during 1975 and 1976. Compared to 1975, the motor vehicle fatalities in 1976 were 16.1% lower, the number of persons injured 13.7% lower, and the number of hospitalized victims 16.1% lower. The cost of active treatment for hospitalized persons (inpatients and outpatients) decreased by 10.7%. The number of persons with minor injuries declined by 13.0%, the moderate to severe injuries by 14.5%. The average acute hospital stay for patients increased from 11.6 to 12.9 days. The average cost of treatment for victims who reported having worn seat belts was $228, while treatment for victims without seat belts had an average cost of $419. Pedestrians and cyclists incurred average costs of $693 and $498, respectively.

by H. I. MacKillop
Publ: Canadian Medical Association Journal v119 n10 p1154, 1156, 1158 (18 Nov 1978)
1978 ; 1ref
Availability: See publication

HS-027 450

RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE

The basic EERRHV (Emergency Escape Ramps for Runaway Heavy Vehicles) types used in the U.S. today are described (gravity ramp, arrester bed, and combination of the two). Positive points of the gravity ramp include: no need for special equipment to remove truck from ramp, minimal routine maintenance, and no impairment by adverse weather. This type of ramp is usually expensive because it must be long enough to dissipate the forward energy of the truck. The arrester bed does not need to be nearly as long as a gravity ramp, and the initial cost is lower. The surface does not require a special treatment, and it is easier to locate near the problem area. Once the vehicle is stopped, it will not roll back, and very little damage is done to the vehicle, although it sometimes takes two wreckers to pull out a tractor-trailer. The ramp surface must be redressed after use, and snow and freezing rain may cause minimal problems. An arrester bed should be wide enough to accommodate more than one vehicle. It is emphasized that no one type or style of runaway ramp is feasible in all situations; each location and physical condition must be considered individually. The success of an EERRHV involves informing the motoring public of ramp function and purpose, and installing signs to inform the driver of ramp location. It is concluded that the use of runaway truck ramps and brake check areas, along with truckers' awareness of the potential dangers of runaway vehicles, may well be the most cost-effective and rational alternatives for minimizing steep grade hazards. Research is needed to obtain certain critical ramp performance data. There are at present no formal de
or construction criteria for guidance in planning these esse
safety features.

by Earl C. Williams; C. Franklin Horne
Publ: ITE Journal v49 n5 p38-41 (May 1979)
1979
Availability: See publication

HS-027 451

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY

Abbreviated reports are provided of three state studies (Okla
ma, Colorado, and South Dakota) which involved in-depth
vestigations of motorcycle crash injuries during periods bef
and after the repeal of mandatory motorcycle helmet use la
Studies were designed to collect motorcycle-related crash d
and supplementary police and medical data; to determine
quency, severity, and body location of injuries, with and wi
out helmet use; and to determine motorcycle helmet usage ra
Also presented is a brief report of preliminary findings o
Univ. of Southern California three-year study on motorcy
accident causal factors and countermeasures.

Publ: American Association for Automotive Medicine v1 n4 p14-9 (Oct 1979)
1979 ; 1ref
Sponsored by National Hwy. Traffic Safety Administration. F
full reports, see HS-804 096, HS-803 681, HS-803 679, and HS
803 996 (available from NTIS). See also HS-027 481.
Availability: See publication

HS-027 452

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979

Eighty-four papers were presented at sessions on the follow
topics: new communication techniques and technologies; lat
and longitudinal considerations of automated highway
guideway vehicles; automotive braking and safety-related
tems; regulatory aspects of mobile communications; pe
mover programs--present and planned; automotive micropro
sor applications and supporting electronics; components
mobile communications systems and tests; simulation of "
world" transit systems; automotive transducers and displ
mobile communications systems; control and communicat
systems; automotive control systems and methodology; mo
communications--radio propagation and interference; and a
matic vehicle locating and monitoring.

Institute of Electrical and Electronics Engineers, Inc., 345 E
47th St., New York, N.Y. 10017
Rept. No. IEEE-79CH1378-9VT ; 1979 ; 420p refs
Includes HS-027 453--HS-027 469.
Availability: IEEE Service Center, 445 Hoes Lane, Piscataw
N.J. 08854

HS-027 453

THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY

A mathematical model was devised to predict the steering performance of an automated guideway system vehicle, especially the effect of some design parameters on lateral motion. It was found that although the clearance between guide wheels and guidewall reduces steering control stability and causes oscillatory lateral motion, this motion is restrained by a connecting rod between the front and rear steering linkages when the steering control gains are chosen appropriately. The mathematical model does not include other degrees of freedom (roll); the vehicle speed is assumed to be constant; and a simplified steering linkage is assumed. Fair agreement was observed between the model calculations and experimental results. The automated guideway transit system is under construction in Osaka City, Japan.

by Masato Abe; Hiroshi Inoue; Norio Wakasa
Niigata Engineering Co., Ltd., Engineering Center, Tokyo, Japan
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p31-6
1979 ; 6refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Technical assistance for the project provided by Vought Corp.
Availability: In HS-027 452

HS-027 454

AUTOMATIC CAR-FOLLOWING--A STUDY OF POSSIBLE CONTROLLERS

A class of linear controllers is considered to determine their relative suitability for maintaining longitudinal separation between individual vehicles on an automatic highway. A modified controller using forward- and backward-looking sensors is examined, using a transmission line analogy. Stability concepts are defined and clarified, and characteristics of a well-behaved system are outlined: local stability, car-following stability for at least some low frequency range of disturbance, small separation of cars (for high capacity), reasonable vehicle performance demand, and smooth acceleration/deceleration. It is concluded that the best solution to the longitudinal separation problem lies somewhere in complexity between the modified controller with equal forward and backward gains and the Levine-Athans controller, which regulates each car's acceleration based on information on the states of all cars in the train.

by Arthur L. Masson
BDM Corp., Dayton, Ohio 45402
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p37-43
1979 ; 17refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Study originally published as Master's thesis, Northwestern Univ.
Availability: In HS-027 452

HS-027 455

AUTOMATIC LONGITUDINAL CONTROL OF HIGHWAY VEHICLES

The requirements of automatic control of vehicles on expressways are stated and the design of a system to meet the requirements is described. The system is based on control by equipment (computers) carried by the vehicles responding to information as to the positions and speeds of surrounding vehicles transmitted to the controlled vehicle through road circuits. A suggested design for these circuits is described. A method for automatic lane-changing is described and the problem of compatibility of automatic and manually-controlled vehicles using the same lanes is discussed.

by William M. Brobeck
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Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p44-7
1979 ; 9refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 456

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM

A Dual Mode Electric Transportation system is under development in which energy is electromagnetically transferred from a powered roadway to moving vehicles without mechanical contact. Energy from the roadway can be used for high-speed, long-range travel, and for replenishing energy stored in the vehicle in batteries or flywheels. The stored energy is then available for short-range travel off the powered highway network. A static prototype of the inductive power coupling was built and tested. Power transfer was demonstrated to conform to the models developed in an earlier phase of the project. The prototype was used to study the power of the coupling mechanism and resulting design improvements were incorporated. Tests of properties of the coupling included electrical characterization of the prototype equipment, measurements of the magnetic force between power source and pickup, measurements of coupled power vs. pickup airgap and offset, measurements of magnetic flux in and around the prototype, and measurements of thermal effects induced by coupled power. The tests resulted in several design improvements which were incorporated into the coupling design. Results from the power coupling study were used to aid in the design of the dynamic prototype, in which a 50 m powered test track and electric car with power pickup will be tested.

by J. G. Bolger; L. S. Ng; David B. Turner; R. I. Wallace
University of California, Lawrence Berkeley Lab., Berkeley, Calif.
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p48-56
1979 ; 3refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Research sponsored by the Dept. of Energy.
Availability: In HS-027 452

HS-027 457

AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES

An overview of the control structure for automated people mover systems is presented, and attention is focused on individual vehicle longitudinal and lateral control. A longitudinal and lateral control system which utilizes a fixed guideway reference system was designed, tested, and developed. The fixed

best copy available

guideway reference system is comprised of guideway-mounted measurement markers and an inductive communication link which provides the means for vehicle state error measurement and control. Vehicle status information and longitudinal commands are transmitted to/from the wayside via the inductive link. Measurements of the electromagnetic field surrounding the communication link are used to obtain estimates of vehicle lateral position error with respect to a prescribed path. These vehicle state error measurements are processed by an on-board vehicle computer, and the proper longitudinal and lateral control commands are generated and applied to the appropriate control equipment to effect the necessary longitudinal and lateral control responses. The following preliminary conclusions are drawn. Using the approach described, specific vehicle dynamics data can be used to provide a good estimate of potential wire following lateral control performance. Lateral paths requiring vehicle yaw acceleration provide the most severe input to a wire-following vehicle. Good longitudinal control accuracy and ride comfort are inversely related. Although analytical predictions of longitudinal control accuracy are useful, final control parameter value selection requires actual hardware testing to select a level of accuracy consistent with ride comfort requirements.

by Ronald R. Smisek; Glenn A. Harder
General Motors Corp., Transportation Systems Div., 12 Mile and Mound Roads, Warren, Mich. 48090
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p57-64
1979 ; 6refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 458

ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID

The Bosch ABS antiskid system is described, which incorporates modern electronics technologies. Two wheel speed sensors measure the angular velocity of the front wheels. In order to minimize brake force differences of the rear axle on roadways with split coefficients, a common control for the rear wheels was chosen. The hydraulic unit comprises three (for front-rear brake system) or four (for diagonal brake system) novel solenoid valves and a return pump driven by an electric motor. Brake pressure can be raised in a steady or stepwise way, held at a constant level or decreased. The electronic unit is mainly digital, with a few integrated circuits. The antiskid system comprises many sophisticated functions which result in high circuit complexity. The digital design allows for a greater integration than the analog design. To ensure optimal system safety, the main components of the system are checked for proper functioning prior to driving the vehicle. En route, the main system components are continuously monitored. The overall antiskid system is switched off once a critical defect has been detected. In that case the normal brake system is available and a warning lamp indicates to the driver that the antiskid system is not functioning. Two German automobile manufacturers are introducing the system and others are expected to follow.

by Heinz Leiber; Armin Czinczel
Robert Bosch G.m.b.H., Stuttgart, Germany
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p65-9
1979
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 459

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM

A microwave automatic vehicle identification (AVI) system is described which utilizes piezoelectric resonators to encode identification numbers of a vehicle and a microwave carrier to transmit information between the transponder and the interrogator system. Elimination of any active elements in the transponder and miniaturization, coupled with the lowering of the transmitted microwave power, are epoch-making advances realized in this system. The system structure, the operational principles of the interrogator and transponder, and the transponder circuit structure are described, as well as an overhead type AVI system which has practical application for toll roads and highways. Other applications include ID cards, electronic locks, and the like, for which the totally passive, compact, and lightweight transponder can be regarded as most suitable.

by Johji Sakuragi; Yoshinori Kimura; Kazuhiko Kameda; Shohichi Kamata
Toshiba Corp., Toshiba Komukai Works, Kawasaki, Japan
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p72-8
1979 ; 8refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 460

MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS

A microprocessor-based, road-test system for measuring and recording rolldown and acceleration data was designed and built. The system provides for rapid testing of vehicles, can be operated by a single individual, and allows detailed data acquisition when required. Digital data storage and output capability allows direct exchange of data with other computers or calculators for data analysis and reduction. System inputs are distance from a fifth wheel, and elapsed time. The microcomputer system records time to the nearest 0.01 sec, distance to the nearest ft, and calculates velocity to the nearest 0.1 mph. Data can be stored at specified time, distance, and velocity intervals. Current time, distance, and velocity are displayed on a liquid crystal display panel. A printing calculator prints a summary of the run. Detailed data is stored in RAM (random access memory) and is output to magnetic tape at the end of the run. The tapes are used to obtain plots and as input for data reduction programs that calculate rolling friction and aerodynamic drag. The road-test system was first used in a fuel-cell powered vehicle program which required characterization of the performance of a number of vehicles. Since it is microprocessor-based, the system is also intended to be used as an expanded data acquisition system for a fuel-cell powered vehicle. The first time the system was used, 12 vehicles were tested for three days. A total of 103 rolldown and 13 quarter mile acceleration runs were made. In most of the tests one person drove the vehicle and operated the road-test system. Data were saved on tape at 1 sec and 1 mph intervals.

by David K. Lynn; Charles R. Derouin; Paul Lamar
Los Alamos Scientific Lab., P.O. Box 1663, Los Alamos, N. Mex. 87544; Lamar Instruments, 2107 Artesia Blvd., Redondo Beach, Calif. 90277
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p154-7
1979
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 461

HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS

The use of transducers in automotive electronic control systems (i.e. electronic fuel injection) is described, as well as high-volume production techniques in manufacturing transducers. Categories of transducer use include emission control (with pressure transducers and speed sensors); antiskid, or anti-wheel-lock (with speed sensors); and diagnostics, such as monitoring ignition timing, measuring wear in brakes, steering columns, and shock absorbers, and monitoring of various conditions in frame and transmission (with speed sensors, linear and angular position sensors, pressure sensors, and acceleration sensors). Problems involving transducer specifications include performance under extreme temperatures, or separation of electronics from the transducer; costs; and consistency in performance. The linear variable differential transformer and the proximity transducer are described, as well as the development of electronic circuitry to interface directly with a digital computer. Future areas of transducer development are outlined.

by Burton F. Drill
Transducer Systems, Inc., Willow Grove, Pa. 19090
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p234-7
1979
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 462

HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM

The main features are outlined of the 800 MHz High Capacity Automobile Telephone System for public mobile services, now under construction in the Tokyo metropolitan area. The major features of this system include high capacity (100,000 subscribers can be accommodated in the same service area); efficient utilization of frequency spectrum in the 800 MHz band (introduction of small radio zone structure (cellular system) for reuse of the same frequency in radio zones with adequate distance for avoiding co-channel interference, the increase in the number of channels commonly used by each mobile unit within a radio zone, and reduced occupied bandwidth of radio channels); and fully automatic exchange for a nationwide mobile service. The following advanced techniques were introduced: vehicle location registration technique, by which a switching equipment memorizes the newest location (paging area) of each mobile subscriber; call hand off technique, which enables continuous conversation when a vehicle moves from one radio zone to another during a call; and multi-channel access control with two kinds of control channels (paging channel and access channel). Improvements being developed to enrich and expand the service are listed.

by H. Kubota; T. Kikuchi
Nippon Telegraph and Telephone Public Corp., Engineering Bureau, Japan
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p238-44
1979 ; 2refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 463

AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY

In order to assess the severity of accidents resulting from high-density traffic on an automated highway system, a methodology is presented to ascertain the severity of one especially critical type of accident: a multi-vehicle collision resulting from the emergency braking of a platoon of automatically-controlled, closely-spaced vehicles. This methodology includes the specification of a collision model, which was based on reported crash-testing results, the selection of an accident severity measure, consideration of a corresponding cost function, and a sensitivity analysis to determine those parameters which most heavily impinge on accident severity and/or cost. The accident severity measurement was simplified because sufficient accident data were not available to justify a more meaningful and complex choice. Necessary data for measuring accident cost in dollars were also lacking, but a qualitative measure of the effects of key parameters on accident severity is provided. The utility of the developed methodology was demonstrated by applying it to three accident scenarios, and resulted in the following observations. "A-1" (the lead-vehicle deceleration to which the platoon can safely respond) should be as large as possible. Accident severity was, in some cases, greatly increased when a serial reaction delay (rather than a single parallel delay) was present. A moderate increase in the parallel reaction delay resulted in a relatively small change in accident severity. Accident severity was very sensitive to decreases in the deceleration capabilities of the following vehicles. Such results, especially in a quantified form, provide useful measures of the effect of making different policy choices.

by Jochen Glimm; Robert E. Fenton
Technische Universitat Carolo-Wilhelmina, Lehrstuhl und Institut fur Verkehrswesen, Braunschweig, West Germany; Ohio State Univ., Dept. of Electrical Engineering, 2015 Neil Ave., Columbus, Ohio 43210
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p271-8
1979 ; 14refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Research sponsored by Deutsche Forschungsgemeinschaft, and Federal Hwy. Administration.
Availability: In HS-027 452

HS-027 464

THE TRUCK ELECTRONIC GOVERNOR SYSTEM

The development of a truck electronic governor system is outlined under the following topics: functional description (to set an upper limit on engine operating speed); desired control improvements (improved transient response to avoid overshoot-undershoot variations, reduced variation of speed with steady-state engine loading); system description (electronic control module, carburetor with built-in governor override linkage, vacuum servomotor operating the throttle override linkage, vacuum regulator and reservoir, and two vacuum check valves); module description (tachometer circuit for determining engine speed); and performance characteristics (improved driveability and consistency of system operation).

by J. F. Kennedy; Vern E. Welch
Ford Motor Co., Electrical and Electronics Div., Dearborn, Mich. 48121
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p289-90
1979
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 465

DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG

Rolling resistance and aerodynamic drag were determined to estimate the retarding forces on a vehicle. These forces are especially important in determining power requirements for an electric vehicle. Rolldown tests were conducted on a number of vehicles on a level drag strip in two directions, with a fifth wheel feeding 100 pulses/ft into a microcomputer system. Time was measured to the nearest 0.01 sec, velocity to the nearest 0.1 mph, and distance to the nearest ft. Velocity and distance were recorded in read/write memory at one-sec intervals, and stored on magnetic tape which was used to plot routines, and for data reduction programs. In order to assure valid data, vehicles were warmed up and weighed, tire pressures checked, windows rolled up, and wind velocity, air temperature and air pressure were measured. It was found that vibration and bounce of the fifth wheel seriously affected the coastdown tests, and efforts were made to minimize these effects. Equations used in calculating rolling resistance and aerodynamic drag are presented, and data analysis techniques are described.

by David K. Lynn; J. B. McCormick; R. E. Bobbett; Charles R. Derouin; J. Nachamkin; W. Kerwin
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Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p292-5
1979 ; 1ref
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 466

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION

A system identification technique is applied to a vehicle undergoing a coastdown test for the determination of the aerodynamic and rolling resistance of the vehicle. The method identifies these characteristics without imposing any assumption on their relationships with velocity. the results of the identification technique show close accuracy with respect to actual vehicle values. This technique can be used in either off-line applications by means of recorded data or in on-line applications. By making use of a small computer installed on board the vehicle, instantaneous values of drag and rolling resistance or their total can be obtained in real time as the vehicle operates in any straight and level roadway condition.

by Richard E. Klein; H. Sehitoglu
University of Illinois at Urbana-Champaign, Urbana, Ill.
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p296-301
1979 ; 5refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 467

IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES

Electromagnetic noise from the ignition systems of more than 11,000 individual vehicles in service in the U.S. in mid-1977 was measured at 50 MHz and 153 MHz. The following similarities and differences are shown between the ignition noise levels of several vehicle sets: the difference in ignition noise levels from the noisiest to the quietest individual vehicles of any selected set is as great as 50 dB or more; the difference from one vehicle set to another is generally quite small; all the vehicle sets examined contained some very noisy vehicles; the greatest difference among vehicle sets was found by classifying them by vehicle type; foreign vehicles are only slightly noisier than U.S. vehicles; and age (or model year) differences are more apparent in U.S. vehicles than in foreign, older vehicle groups being noisier than groups of later models.

by Richard A. Shepherd; James C. Gaddie
SRI International, Menlo Park, Calif. 94025
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p315-21
1979 ; 13refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Research sponsored by Motor Vehicle Manufacturers Assoc.
Availability: In HS-027 452

HS-027 468

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER

The use of the new computer controlled automatic spectrum analyzer brings "instant" analysis to SAE J551d radio interference measurements, enabling manufacturers of automotive products to reduce radio interference levels economically. A brief history of automotive radio frequency (RF) interference and the beginnings of SAE J551 are presented. Measurement techniques are described, beginning with manual recordings on an individual frequency basis, then advancing to semi-automatic X-Y plotting on an octave-by-octave basis, to automatic X-Y plotting, and finally to the computerized automatic spectrum analyzer with finalized semi-log charts ready for report presentation. Various RF measurement methods are compared to show the advantages and disadvantages of each. Among the big advantages of the computerized spectrum analyzer are increased reliability and the presentation of the data in a conventional format, easy to understand by management as well as by engineers. Reduction of total time from the taking of data to final presentation is in the order of tenfold over X-Y plotting, and one hundredfold or more over manual measurements.

by James C. Klouda; Norman W. Wehling
Elite Electronic Engineering Co., 1516 Centre Circle, Downers Grove, Ill. 60515
Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p331-5
1979
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 469

MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES

A tightly connected multimicroprocessor computer system is described, with reduced overhead due to shared resources by using separate modules and a hardware arbiter (access) control system. Use of programmable peripherals permits a large number of input/output lines, giving easy interface reconfigurability. Use of the system in developing engine control strategies is outlined. Complex interface with actuators and sensors is managed by an interrupt driven software, which takes advantage of the parallel structure to enable synchronization with engine timing. Hardware modularity and distribution of computing load allow a high degree of run time interaction between user and control system. System compactness is such that the same controller can be used for different steps of experimentation as required.

by M. Beltrami; E. Pellegrino; R. Scalet; M. Scarnera
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Publ: HS-027 452, (IEEE-79CH1378-9VT), "IEEE (Institute of Electrical and Electronics Engineers) Vehicular Technology Conference (29th) Record," New York, 1979 p396-403
1979 ; 3refs
Conference held in Arlington Heights, Ill., 27-30 Mar 1979.
Availability: In HS-027 452

HS-027 470

THE SEATED BUS PASSENGER--A REVIEW

Seven aspects related to the ergonomics of the bus passenger are discussed: approach to the seat, access to the seat, dimensional aspects of the seat, seat shape, seating layout and configuration, seat strength (structural stiffness under impact), and dynamic aspects of travel comfort. A two-phase study was undertaken by Leyland Truck and Bus on all aspects of the bus travel environment, especially the problems encountered by the elderly. Many of the seven ergonomic factors are interrelated, but studies performed on moving to the seats and dynamic travel comfort have identified the importance of vehicle acceleration and jerk. Comfort, stability, and safety of all bus passengers are affected by acceleration conditions in the vehicle. Careful design of seat structure and detailed analysis of accident data have shown that, under accident conditions, passenger injuries can be minimized. Different requirements of various categories of the traveling population have been identified in rig studies. Study results and application of appropriate anthropometric data have resulted in optimum use of the space available on the vehicle, this being reflected in recommendations for seat layout, shape, and dimensioning. Much of this work has been incorporated in the design and development of a new double-deck bus, the Leyland Titan.

by J. A. Levis
Publ: Applied Ergonomics v9 n3 p143-50 (Sep 1978)
1978 ; 4refs
At head of title: Ergonomics for Passenger Comfort. Sponsored by Transport and Road Res. Lab. (England).
Availability: See publication

HS-027 471

JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.

A comprehensive picture of the traffic accident situation in Japan (primarily in 1978) is given. The report includes results of studies of traffic safety measures implemented in fiscal year 1978, and plans for implementation of such measures in fiscal year 1979. Road, railway, marine, and aviation accidents and their countermeasures are discussed separately. In highway accidents, there were 8783 fatalities in 1978, a 1.8% decrease from 1977 and a 47.6% decrease from the peak year of 1970 when there were 16,765 fatalities. The annual fatalities have been steadily decreasing for the eight years since 1971. On the other hand, the number of persons injured in traffic accidents increased slightly to 594,116, a 0.2% increase over 1977. There are tremendous regional differences in traffic fatality rates. Pedestrian and bicyclist deaths made up nearly one-half of the total fatalities; the number of people killed while riding two-wheeled vehicles is on the increase. There were increases in traffic accidents among the 7- to 15-year-old group and the elderly (over 70). A high percentage of fatal accidents were associated with drunken driving, speeding, and driving without a license. Train accident fatalities and injuries showed a decrease. The number of ship accidents decreased by 12 from 1977, but there was an increase of 15 dead or missing. There were the same number of air traffic accidents in both 1977 and 1978, with 17 less fatalities but nine more injured persons in 1978.

Prime Minister's Office, Japan
1979 ; 235p refs
See also 1976 ed., HS-020 572; 1977 ed., HS-023 330; 1978 ed., HS-024 709.
Availability: International Assoc. of Traffic and Safety Sciences, 6-20, 2-chome, Yaesu, Chuo-ku, Tokyo, 104, Japan

HS-027 472

STATISTICS '78 OF ROAD TRAFFIC ACCIDENTS IN JAPAN

Statistical data are tabulated on the road traffic situation in Japan from 1946 through 1978: vehicle registrations, population, driver's license holders, total road length, and motor vehicle km traveled (VKMT). Traffic accident historical trends are indicated in tables on accidents and casualties; fatalities by prior movement of road user; casualties per 100 million VKMT, and per number of vehicles and population; comparison of police and Ministry of Welfare statistics on fatalities; and accidents by day and night. For 1978, separate sections provide tabulated data on traffic accidents, fatal accidents, casualties, child casualties, and traffic accidents on expressways. Statistical information is also tabulated for various years concerning traffic violations, traffic regulations and controls, driver's license holders, company safe-driving supervisors and administrators, and road conditions.

National Police Agency, Traffic Bureau, Japan
1979 ; 59p refs
Availability: International Assoc. of Traffic and Safety Sciences, 6-20, 2-chome, Yaesu, Chuo-ku, Tokyo, 104, Japan

HS-027 473

FREEWAY TRAFFIC MANAGEMENT. FINAL REPORT

An overview is provided of proven traffic control techniques for reducing congestion and improving operations on urban freeways. These techniques will be of interest to highway administrators, legislators, and other public officials. Alternative measures are described that are being used effectively in various cities to deal with the compound problem of ever-increasing traffic demand on existing freeways and de-emphasis on providing new facilities. Operational and safety problems typical to an urban freeway corridor, a range of options for dealing with these problems, and guidelines for implementing and operating freeway control systems are described. The discussion is based on previous research, actual experience from operating freeway control systems in various parts of the U.S., and numerous interviews with individuals having responsibility for those systems. Included are abstracts of six major reports on freeway traffic management, and a selected bibliography.

by Donald G. Capelle
Alan M. Voorhees and Associates
1979 ; 68p 93refs
Rept. is part of the National Cooperative Hwy. Res. Prog., administered by the Transportation Res. Board and sponsored by American Assoc. of State Hwy. and Transportation Officials in cooperation with Federal Hwy. Administration.
Availability: TRB $4.00

HS-027 474

THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE

An evaluation was made of the combined impact of the Tennessee child restraint law and its associated promotional campaign on restraint usage rates, including comparisons between users and nonusers. On 1 Jan 1978, Tennessee enacted a law establishing safety requirements for child passengers under four years of age. A public information and education (PI and E) campaign was simultaneously initiated which called for distribution of brochures and posters in pediatricians' offices, hospitals, etc., as well as an extensive mass media effort. The distribution program was implemented and evaluated in five target areas, the mass media program in one target area. Baseline data were obtained just prior to law and campaign implementation; six months later, parallel surveys were conducted. It was found that the combined law and distribution campaign was effective in increasing restraint usage rates, with the mass media program assuring even higher usage rates. Usage was found to be associated with child's age, all socioeconomic variables (e.g. family income and education level), other demographic and vehicle data, and the wearing of seat belts. A market segmentation strategy for future PI and E campaigns is proposed.

by J. W. Philpot; K. W. Heathington; R. L. Perry; E. C. Hughes
University of Tennessee, Transportation Center, Knoxville, Tenn. 37916
Rept. No. TC-78-019 ; 1979 ; 31p 35refs
Sponsored by Tennessee Governor's Hwy. Safety Prog., and National Hwy. Traffic Safety Administration.
Availability: Corporate author

HS-027 475

LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB

The National Safety Council's Child Safety Club teaches children, ages three through five, how to stay safe at home, at play, and in traffic, through games they can play with adults. During this age period, a child receives five books at six-month intervals. Each book builds on previous lessons, but focuses on the new hazards the child encounters as his horizons widen. Safety activities include puzzles, quizzes, and pop-outs. Each book offers interesting information about traffic, home, and recreational safety which the adult discusses with the child. A picture page opposite each page of text illustrates a major safety topic. Some of the pictures contain "do-it-together" activities; real-life practice experiences are presented at the conclusion of each topic. Traffic lessons cover safe playing outdoors (never play in the street and walk only on the sidewalk), and using a child safety seat (and a seat belt for the adult). Children under three may be enrolled any time after birth, but will not receive the first book until their third birthday. Child Safety Club memberships are $15 for the complete package, including mailing costs. A special rate of $13.50 is offered to organizations who sell 50 or more memberships, providing them with a small profit when they sell the memberships at the regular price.

Publ: Traffic Safety v79 n10 p8-9 (Oct 1979)
1979
Availability: See publication

HS-027 476

THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT

The public information and education program manager for the Arkansas Hwy. Safety Prog. discusses his successful experience in coordinating the fight to preserve his state's motorcycle helmet law. The "secrets" of this success are discussed, with the pitfalls encountered, and some methods to avoid them. In preparing for such an effort, it is recommended that a good "inside person" (preferably a legal aide working for the legislative council) be consulted. The value of doing research is emphasized, and acknowledgement is given to the special assistant for public information and community support at the National Hwy. Traffic Safety Administration. Putting too much stock in the predictability of the opposition's strategy is not advised. Private visits are recommended with legislators to explain one's position, particularly with those serving on committees most likely to consider the repeal or modification bill. Other prehearing steps include: obtaining public opinion data, enlisting the aid of high-placed officials (if popular with the legislature), getting the support of professional and civic organizations, assembling a balanced group of speakers to testify, and rehearsing the presentation. Contact with the American Civil Liberties Union is also suggested. Suggestions for the hearing itself include filling the room with supporters, letting the opposition speak first, using notes rather than prepared speeches, keeping statements short, avoiding redundancy, being economical with statistics, being alert to possible manipulation of data by opposition, and not letting the opposition claim that they are representative of all motorcyclists nor letting them divert attention from helmets to motorcycle rider education.

by Edward Lovett Kramer
Publ: Traffic Safety v79 n10 p18-20, 28-30 (Oct 1979)
1979 ; 1ref
Availability: See publication

HS-027 477

BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES

Two groups of four chronic alcoholic subjects lived in Rutgers' Alcohol Behavior Res. Lab. for separate two-week periods, during which time they were taught to attend either to internal or to external cues to blood alcohol level (BAL). During a single training session, subjects received feedback on actual BAL following each of their BAL estimates. During pretraining and posttraining sessions, assessments of BAL estimation accuracy were obtained in the absence of feedback. Prior to training, both groups of alcoholics were equally inaccurate in estimating BAL. During training, when accurate BAL feedback was provided, estimation accuracy increased significantly for both groups. Once feedback was removed during the posttraining test session, only externally trained (via a programmed learning booklet) subjects maintained the ability to estimate BAL accurately. It is concluded that unlike the nonalcoholic subjects studied by Huber, Karlin, and Nathan, the alcoholic subjects of this research did not learn to discriminate BAL on the basis of internal feelings and sensations nearly as well as when they referred to external cues.

by David Lansky; Peter E. Nathan; David M. Lawson
NIAAA-AA00259-07
Publ: Journal of Consulting and Clinical Psychology v46 n5 p953-60 (Oct 1978)
1978 ; 23refs
Availability: See publication

HS-027 478

SCALING PERCEIVED DISTANCE ALONG A ROAD

The relationship between perceived and real distance along a road was investigated using the method of fractionation in a field experiment and two laboratory experiments. In each case, data were well fitted by a modified form of Stevens' power law. Although one laboratory experiment failed to reproduce field study results, when distance stimuli were improved by using ordinary cars instead of lights to define standard distances, laboratory results were closer to those obtained in the field.

by Errol R. Hoffmann; Wendy A. MacDonald
Publ: Australian Journal of Psychology v30 n1 p69-77 (1978)
1978 ; 12refs
Availability: See publication

HS-027 479

HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY

Postmortem radiographic examination records of 312 victims of fatal traffic accidents were analyzed with respect to injuries to the cervical spine. One-third of the subjects were pedestrians struck by a vehicle; the others were occupants of various motor vehicles and a few bicyclists or motorcyclists. Twenty-four percent of the victims radiographically demonstrated neck injuries. Most fractures and dislocations in this group were found to involve the craniocervical junction and the upper two cervical segments. Over one-half were flexion injuries; one-fifth were caused predominantly by extension; the mechanism of one-fourth of the injuries could not be determined, although they were probably due to lateral forces or a combination of several vectors. Flexion and extension views were particularly helpful in demonstrating the instability of many injuries. The high incidence of upper cervical and craniocervical junction injuries emphasizes the importance of continued research into safety devices for protection in this vital area. Seat belts, particularly the harness type, and head restraints would appear to afford protection to the torso and tend to reduce extension injuries of the neck, although these devices afford little protection against flexion injuries of the upper cervical spine. It appears that the air bag should help in reducing this type of trauma.

by George J. Alker, Jr.; Young S. Oh; Eugene V. Leslie
Publ: Orthopedic Clinics of North America v9 n4 p1003-10 (Oct 1978)
1978 ; 9refs
At head of title: Symposium on the Upper Cervical Spine.
Availability: See publication

HS-027 480

AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES

On seven weekdays in Mar-Apr 1979, drivers were interviewed and restraint use observed in 122 vehicles being used to deliver and pick up children at seven nursery schools and daycare centers in Baltimore County, Maryland. The vehicles carried 151 children; 58% were age three to four and 5.5% were younger (the median age being four). Only 15 children (10%) were restrained, primarily with lap belts. The majority of the children (54%) were traveling in the front compartment of the vehicle. Of the 131 adults in the vehicles (73% being women), only 11 (9%) were wearing seat belts. Safety belt use by adults was most common in the highest socioeconomic groups; among children, this correlation was less marked. Of the 122 drivers interviewed, 81 believed that restraint use should be required by law for children, 21 disagreed, and 20 were undecided. Seventy-eight percent said they would restrain their children and 84% would restrain themselves if they were required by law. Fifty-five percent of the drivers said they did not have problems with the use of seat belts or child seats to restrain their children. The most frequent complaint (8%) was that the shoulder portion of the combined lap-shoulder belt was not designed for children, rubbed against the neck, and/or was dangerous. Child restraint legislation is recommended, as well as better public information for parents, and consideration of acceptability and convenience by vehicle and safety device manufacturers.

by David W. Jones
Publ: American Association for Automotive Medicine v1 n4 p26-9 (Oct 1979)
1979 ; 13refs
Availability: See publication

HS-027 481

IMPACT OF MOTORCYCLE HELMET LAW REPEAL

Comparable periods before and after repeal of the Kansas motorcycle helmet law, effective 1 Jul 1976, were studied in terms of number of crashes, number of motorcycle registrations, injury severity, rate of injury, and number of fatalities. It was found that there was a significant difference in the fatality and injury rates based on helmet usage. During the 1975 period, six motorcycle fatalities occurred; during the 1976 period, there were 11 fatalities. When comparing fatalities to motorcycle registrations, there was a 95% increase in the fatality rate between law and repeal periods. The crude death rate for those not wearing helmets was 333% higher than that for helmeted riders. Between 1975 and 1976, there was an increase of 17% in the crude rate for general body injuries, an 8% increase in rate of injuries to the extremities, and a 51% increase in the crude rate of head injuries. The injury rate for the nonhelmeted population was 25% greater than for persons with helmets. The former had a 106% higher rate of head injuries, and a 67% higher mean injury severity score. The use of helmets was significantly higher during the period when the helmet legislation was in effect. It can be concluded that a mandatory helmet use law significantly reduces motorcycle crash-related death and serious injury because more drivers and passengers wear helmets when required by law. The status of state helmet-use laws is tabulated in a separate section.

by Norman E. McSwain, Jr.; Michael Lummis
Publ: American Association for Automotive Medicine Quarterly/Journal v1 n4 p29-32 (Oct 1979)
1979 ; 5refs
Sponsored by Department of Transportation. See also HS-027 451.
Availability: See publication

HS-027 482

GASOHOL. A TECHNICAL MEMORANDUM

The technical and nontechnical (economic, environmental, and social) issues surrounding the development of gasohol (10% ethanol, 90% unleaded gasoline) are addressed. The resource base, production technologies, and economics of gasohol, and its use as a transportation fuel are discussed. Also considered are the environmental problems and benefits of producing and using gasohol, and the social and institutional issues concerning use of agricultural products for energy. Current Federal gasohol programs and policies are summarized, but policy options are not analyzed. Estimates are provided of how much gasohol can be used at what cost, and of the long-term prospects of ethanol production. Major areas for research and development are identified (feedstocks, conversion and end use).

Congress of the United States, Office of Technology Assessment, Washington, D.C. 20510
Rept. No. OTA-TM-E-1 ; 1979 ; 90p 41refs
Availability: GPO, stock no. 052-003-00706-1

HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT

A study was performed to define the performance and cost characteristics of a solar-powered, steam Rankine turbine system located at the focal point of a solar concentrator. A two-stage re-entry turbine with reheat between stages was selected for the conceptual design. This system has an efficiency of 27% at a turbine inlet temperature of 732 degrees C (1350 degrees F) where system efficiency is defined as 60 Hz electrical output divided by absorbed thermal input in the working fluid, Toluene. Mass production system costs would be approximately $364/kw; operation and maintenance costs, $0.0078/kwh. The principal conclusion of the study is that relatively high steam turbine Rankine system efficiencies are achievable with good off-design performance; but advancement of the state of the art, in the form of turbine interstage sealing techniques, is required to achieve this performance.

by Timothy J. Bland
Sundstrand Advanced Technology Group, 4747 Harrison Ave., Rockford, Ill. 61101
NASA-DEN-3-61
Rept. No. DOE/NASA/0061-79/1; NASA-CR-159589; AER-1713 ; 1979 ; 64p 9refs
Prepared under Interagency Agreement EX-76-A-29-1060. See also HS-027 484.
Availability: NTIS

HS-027 484

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT

A study was undertaken to identify steam Rankine power conversion concepts with the potential for significantly improved efficiency at the lower power levels associated with point focusing distributed solar systems. Parametric studies led to the selection of 677 degree C (1250 degrees F) and 17.2 x 10 to the 6th power N/sq m (2500 psi) as maximum steam inlet temperature and pressure. A conceptual design of a 3600 rpm reciprocation expander was developed for maximum thermal input power of 80 kW. The conceptual design covered two engine configurations; a single-cylinder design for simple cycle operation and a two-cylinder design for reheat cycle operation. The reheat expander contains a high-pressure cylinder and a low-pressure cylinder with steam being reheated to the initial inlet temperature after expansion in the high pressure cylinder. Power generation is accomplished with a three-phase induction motor coupled directly to the expander and connected electrically to the public utility power grid. The expander, generator, water pump and control system weigh 297 kg (654 lb) and are dish-mounted. The steam condenser, water tank and accessory pumps are ground-based. Maximum heat engine efficiency is 33%; maximum power conversion efficiency is 30%. Total cost is $3307 or $138 per kW of maximum power output.

by W. Wingenbach; Jay Carter, Jr.
Jay Carter Enterprises, P.O. Box 684, Burkburnett, Tex. 76354
NASA-DEN-3-63
Rept. No. DOE/NASA/0063-79/1; NASA-CR-159591 ; 1979 ; 47p 5refs
Prepared under Interagency Agreement EX-76-A-29-1060. See also HS-027 483.
Availability: NTIS

HS-027 485

ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES

A statewide survey is reported of Arkansas motorists' perceptions, attitudes, and behavior patterns regarding the fifty-five miles per hour speed limit, and their usage patterns and attitudes concerning safety belts, child restraint systems, air bags, and motorcycle helmets. It was found that about one-half of the motorists exceed the speed limit, mostly by only ten mph or less, which is apparently considered to be the "effective" speed limit given perceived levels of enforcement. Most motorists recognize the fatality and accident reduction effect of the 55 mph speed limit, and they favor retaining the law for these reasons, not for saving gasoline. It was found that nonuse of safety belts is extremely widespread, not because of major objections to safety belts but because of motorist laziness or thoughtlessness. The same rationale exists for not using child restraint systems, although these systems are used to a somewhat greater extent. A surprisingly large number of motorists are aware of air bags and how they work. The motorists may favor mandatory air bags precisely because they are passive. The respondents were not informed of air bag costs when interviewed. Motorcycle helmets are by far the most widely accepted safety device among Arkansas motorists; they are accepted and supported almost unanimously.

Area Market Res. Associates, 2200 First National Bldg., Little Rock, Ark. 72201
1979 ; 114p
Sponsored by Arkansas Dept. of Public Safety.
Availability: Arkansas Hwy. Safety Prog., 705 South Pulaski, Little Rock, Ark. 72201

HS-027 486

ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS

A statewide survey is reported of Arkansas motorists' awareness, opinions, and behavior patterns with respect to drinking and driving and the nature and enforcement of laws concerning those activities. Nearly two-thirds of the Arkansans surveyed report never drinking at all. They are generally well-informed of alcohol's effects but unaware of the alcoholic potency of beer and wine. By a three-to-one margin, the drivers are well aware of diminished driving ability after a "few" drinks, but somewhat uninformed about how to become sober. Almost none of the drivers are aware of the true legal meaning of driving while intoxicated (DWI) and most do not know the amount of drinking required to reach the legal limit. They are quite uninformed about DWI consequences. By a three-to-one margin, Arkansans believe the DWI penalties are fair. They are uninformed about available state drinking/driving programs. By a nine-to-one margin, a program of alcohol education in the public schools is favored. Arkansans' media attention patterns are close to national norms, with most radio listening during morning and afternoon commuting periods, and most television viewing during prime time.

Area Market Res. Associates, First National Bldg., Little Rock, Ark. 72201
1979 ; 82p
Availability: Arkansas Hwy. Safety Prog., 705 South Pulaski, Little Rock, Ark. 72201

HS-027 487

METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES

Wind tunnel tests, full-scale coastdown tests, and extended road running have been compared as methods of evaluating the effectiveness of devices for reducing the aerodynamic drag of heavy commercial vehicles. Comparing the results of the coastdown tests with an accurately detailed 1/10 scale wind tunnel test, it is concluded that the latter method is the best means of examining basic aerodynamic effects. Coastdown tests are too susceptible to the effect of small variations in experimental conditions to be effective in evaluation. For the fleet operator, the best method is probably a road test comparing the performance of a modified and an unmodified vehicle. In the U.S., such a two-vehicle road test procedure has been recommended by the Regular Common Carrier Conference/Society of Automotive Engineers; details of the Recommended Practice are appended.

by T. Williams; D. Jacklin
Transport and Road Res. Lab., Transport Engineering Div., Crowthorne, Berks., England
Rept. No. TRRL-SR-481 ; 1979 ; 25p 7refs
Availability: Corporate author

HS-027 488

M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)

A system of two-way traffic using lanes of substandard width to provide two traffic lanes in each direction on a single three-lane roadway was implemented during the reconstruction of a section of M6 motorway (freeway) in Staffordshire, England during 1976. Despite the reduced lane widths (2.75 m for light vehicles, 3.35 m for heavy vehicles), the capacity and journey-time/flow relations for the site did not differ appreciably from those for standard lanes. Even when the hard shoulder (which was in use as a traffic lane) failed locally under the weight of the heavy vehicles, and the relative positions of the light and heavy vehicles were reversed to reduce the loading on the hard shoulder, the extra maneuvers involved did not appear to affect the performance of the site. Overall, the delays averaged only 270 vehicle-hr/day, and these would have been considerably higher if any other method of operation (segregated contra-flow or two-way operation with standard-width lanes) had been used. The accident rate at the site averaged 35 injury accidents per 100 million vehicle-km, rather less than that experienced in general at other major road construction sites, whether or not narrow lanes were used. The increased accident rate was confined entirely to the daytime accidents. It is concluded that narrow lanes are not specially hazardous.

by A. D. Maclean
Transport and Road Res. Lab., Traffic Systems Div., Crowthorne, Berks., England
Rept. No. TRRL-SR-474 ; 1979 ; 22p 2refs
Availability: Corporate author

HS-027 489

ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS

A test track experiment was conducted to compare the operational feasibility of four alternative priority markings for urban T-junctions as a preliminary step to a safety evaluation on public roads. The first major/minor road design was conventional, with the stem of the T as the minor road approach. As unconventional layouts, the second and third designs, respectively, had the right arm and the left arm of the head of the T as the minor road approach; the "major" route was defined accordingly to turn on the left or the right shoulder of the T. The fourth design was a small traffic circle with offside priority markings on all approach roads; this is a proven option with traffic and safety benefits. The main objective was to evaluate the turning-priority designs in terms of delay, capacity, and driver response. It was concluded that both unconventional designs would be acceptable to drivers and would not cause traffic engineering problems. The left shoulder layout would be preferable, and several pilot installations of this alternative are recommended prior to a large-scale trial to determine its effect on traffic safety.

by C. R. Faulkner
Transport and Road Res. Lab., Traffic Systems Div., Crowthorne, Berks., England
Rept. No. TRRL-SR-472 ; 1979 ; 19p 2refs
Availability: Corporate author

HS-027 490

"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM

The design and construction are described of an automatic system for controlling the intensity of the low beam headlight according to the quality of the street lighting. Results are reported of large-scale trials of the system installed in Post Office and Police vehicles, with particular attention given to driver acceptability and system reliability. It was found that many drivers were not satisfied with the performance of the automatic system, and the failure rate of the units was found to be unacceptably high. Driver dissatisfaction was the result of "flashing" effects experienced in slow-moving traffic. As it is not possible to modify the units to overcome drivers' objections, it is recommended that the development of the automatic system be discontinued. Work on the "town beam" (dimmed low beam) should concentrate on a manual system which is controlled by the driver.

by J. A. Reid
Transport and Road Res. Lab., Accident Investigation Div., Crowthorne, Berks., England
Rept. No. TRRL-LR-880 ; 1979 ; 33p 8refs
Availability: Corporate author

HS-027 491

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)

Research was undertaken to develop an efficient way of using traffic and highway characteristics to identify highway segments having a high potential for wet weather accidents and to develop a priority rating scheme for using maintenance funds to maximize accident reduction. The first of two wet weather safety indices developed, WWSIa, is an analytical index based on a number of previous analytical and empirical studies on tire-pavement friction, vehicle handling and stability, potential for hydroplaning, and visibility during periods of rainfall. The index is a site-specific formulation which will enable highway engineers to select appropriate combinations of road surface geometrics, surface textures and skid numbers for the design of road elements, as well as to analyze existing sites. The second, WWSIe, is an empirical formulation based on prediction equations for wet accident rates. The equations were derived by multiple regression techniques from a survey of 60 highway segments in Texas. These segments covered a range of wet accident rates from zero to 40 accidents per year per mile. In general, much higher values of wet accident rates are observed in urban areas than in rural areas. The sensitivity to pavement skid resistance is also much higher in urban than in rural areas.

by Don L. Ivey; Lindsay I. Griffin, 3rd.; Tommy M. Newton; Kenneth C. Hankins; Charles W. Blumentritt; Robert L. Lytton
Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
2-10-77-221
Rept. No. TTI-RR-221-1F; FHWATX77-2211F ; 1977 ; 139p 27refs
Rept. for Sep 1976-Oct 1977. Sponsored by Texas State Dept. of Highways and Public Transportation, in cooperation with Federal Hwy. Administration.
Availability: NTIS

HS-027 492

DRIVER EYE HEIGHT: A FIELD STUDY

A photographic method was used to collect a sample of dynamic observations of driver eye heights for normal driving positions and under normal conditions. Analysis of the sample indicated that driver eye heights for 89% of the compact and smaller passenger cars and 73% of the intermediate and full-size passenger cars were less than the present standard eye height of 3.75 ft used in design and traffic engineering practice in 1975. Only 15% of the driver eye heights were found to be less than 3.75 ft in a 1960 study. It is suggested that presently calculated safe passing sight distances as well as designs of vertical curves may be inadequate and unsafe. No-passing-zone striping and design of roadway vertical and horizontal curves should consider such reduced driver eye height standards. The 15th percentile value of 3.5 ft found in this study would provide a suitable standard.

by Wiley Cunagin; Tony Abrahamson
Publ: ITE Journal v49 n5 p34-6 (May 1979)
1979 ; 6refs
Availability: See publication

HS-027 493

CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)

Recent efforts by the California Department of Transportation (Caltrans) to improve the safety of motorists, pedestrians and workers in highway construction/maintenance zones are described, as well as the current planning effort to provide safety training about these sites on a statewide basis. A July 1965 study by Caltrans of accident rates within construction zones resulted in a number of recommended practices now recognized nationally: design of zone detours for the speeds vehicles will travel, avoidance of sudden changes in geometric standards or speed limits, engineering of the traffic way to the highest practicable standards, and removal of superseded pavement markings. A 1970 study of these practices proved their accident reduction effect. In 1967 and 1968, highway safety seminars were conducted for Caltrans and city, county, and Federal employees on providing safer facilities for travelers and maintenance workers. A 1974 study identified work functions and related tasks which are most hazardous to maintenance and construction personnel. Caltrans has continued to conduct "before" and "during" construction zone accident studies on a sample of projects. In July 1977 and in May and July 1978, the Federal Highway Administration's (FHWA) course, "Traffic Control for Street and Highway Construction and Maintenance Operations," was presented to Caltrans and local agencies. By July 1978, a technical advisory committee representative of the intended audience had been formed to develop a training program on construction/maintenance zone construction safety. In December 1978, instructors attended an FHWA "Training for the Trainers" course, and in March 1979, the first of 140 two-day "Safety through Construction and Maintenance Zones" training sessions is to be presented in California. The course, to be given under the sponsorship of the University of California's Institute of Transportation Studies, has been designed for an estimated 4000 Caltrans personnel, and city, county, contractor, and public utility company employees.

by Alvord C. Estep
Publ: ITE Journal v49 n4 p24-7 (Apr 1979)
1979 ; refs
Availability: See publication

HS-027 494

MOTORIST INFORMATION NEEDS IN WORK ZONES

As one of the underlying concepts of Positive Guidance, the decision sight distance concept is discussed. Essentially, it presents a model of the driver's needs in coping with a hazard ahead by defining hazard-avoidance subtasks and their time frames, so that displayed information may allow time for effective performance in negotiating the hazard. The decision sight distance concept, as applied to a work zone, is illustrated through a hazard avoidance model. The subareas of a construction zone which provide different information to the driver, or "information handling zones", are depicted. A flow chart combines the information handling zones, driver tasks/actions required in each, decision sight distance processing times, information required, and display options (using a one lane closure situation on an open highway as the example). The proper presentation of display information for the effective, safe negotiation of a work zone is discussed. The importance is emphasized of the total impression conveyed by all work zone elements. The system should present a consistent, clear, credible image so that the driver knows exactly what to do and is given enough time to do it. The motorist's most important work zone needs are: adequate relevant advance information, channelizing and delineation of a clear path through the work zone, use of devices and markings consistent with driver expectancies, adequate maintenance of work zone information sources, and credible information systems.

by Richard F. Pain; Beverly G. Knapp
Publ: ITE Journal v49 n4 p36-40 (Apr 1979)
1979 ; 13refs
Availability: See publication

HS-027 495

HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES

Four liability lawsuits are reviewed concerning work zone traffic accidents. The first accident occurred at a bridge removal site in which the driver was critically injured and his passenger killed after the vehicle failed to make a turn and struck a crane. Suits were filed against the bridge contractor, alleging failure to adequately and appropriately provide warning to the traveling public. The contractor was found guilty of negligence because of alleged oversigning 500 ft prior to the point of "detour" and failure to reflectorize barrels and barricades adequately at a run-around. The jury also found the driver guilty of contributory negligence, which barred recovery in that particular state. The second case involved a head-on collision (resulting in very severe injuries) at a median crossover, with two-lane, two-way traffic proceeding on one side of a four-lane divided roadway due to repair and bridge construction on the remaining two lanes. This accident was found related to inadequate traffic controls at the site. The contractor made an out-of-court settlement with the plaintiff. The third case involved a resurfacing project on a two-lane rural highway. Four curves on the section were superelevated, and before the shoulders were brought up to grade, a pickup truck was apparently forced off the road and overturned. A passenger in the truck who was ejected is now a quadriplegic. The contractor settled his portion of the litigation out of court. However trial court ruled that the state could not contract away its responsibility for providing and maintaining a safe roadway. The award was nearly $1,000,000. The final case involved an accident at a very sharp crossover area on a four-lane divided highway. The Dept. of Highways was found negligent in the design of the crossover and provision of adequate warning and guidance to the motorist.

by Jack B. Humphreys
Publ: ITE Journal v49 n4 p44-7 (Apr 1979)
1979 ; 7refs
Availability: See publication

HS-027 496

THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS

The likely paths of pedestrians at signalized intersections in Brisbane, Australia are considered where the method of control is a shared phase with motor vehicles or is an exclusive pedestrian phase for any direction of crossing. The four types of pedestrian control at intersections include simultaneous release of pedestrians and turning vehicles, late or early release of pedestrians, and exclusive pedestrian phases or "scramble" (i.e. pedestrians crossing directly or diagonally). The last type of control is used in Australia. Equations are provided for calculating the delays in both modes of pedestrian crossing and the Australian calculation method for determining signal timing plans is presented. A simple numerical example shows that whatever the method of pedestrian control, standard or scramble, the signal cycle time used in Australia should be reduced to lessen pedestrian delay at signalized intersections. It is shown that there is a considerable increase in vehicle and pedestrian delay with scramble crossing.

by Robert Lindsay Pretty
Publ: ITE Journal v49 n5 p20-3 (May 1979)
1979 ; 10refs
Availability: See publication

HS-027 497

THE FUEL-SAVING SHAPE OF CARS TO COME

CAFE (corporate average fuel economy standards) is the main factor at work in reshaping U.S. cars for the future. In the 1980's, American-made cars will be made smaller (to meet fuel economy standards), but prices will rise at about the same rate as inflation if there are no Federal anti-inflation guidelines. New braking, steering, and suspension designs will provide quicker stops, more precise steering, and less roll and sway in corners. In 1983, the compact car will be the size most produced. Front-wheel drive will be more prominent as a weight (and gas) saving measure. Further weight reductions will be achieved by the use of more aluminum and plastic to replace steel. More cars will be driven by four- and six-cylinder engines equipped with turbochargers. Electronic engine controls will set spark timing for fuel economy and lower emissions by adjusting the air-fuel mixture. They will also diagnose engine problems. Aerodynamic improvements to reduce drag will also help improve gas mileage. To improve power use of automatic transmissions, a lock-up device (mechanical connection between engine and transmission in top gear) and overdrive will be employed, and there may be an increasing consumer interest in manual transmissions, both as a gas-saving measure and for driving fun. Beginning with 1982 models, passive restraints must be installed in full-size cars. By 1984, all new cars will have them. Padded dashboards, improved bumpers, and other safety features are already familiar to car owners. Economical subcompact pickups, some designed to convert to station wagons, may be offered to compete with Japanese makes while smaller and more economical vans may also be introduced.

by Jerry Edgerton
Publ: Money v8 p32-5 (Aug 1979)
1979 ; refs
Availability: See publication

HS-027 498

CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)

A brochure provides safety tips for the motorcyclist to protect him from his greatest single source of danger, i.e. not being seen by other road users. The easiest and most effective way to improve conspicuity is to keep the headlight on during daylight hours. A bright helmet and colorful clothing will attract attention and will provide motorists with a larger visual reference point to gauge motorcycle distance and speed. Fluorescent colors in orange, yellow, and red are recommended. At night, reflective tape on the helmet and reflective trim on clothing are best. At the least light colored clothing should be worn or a reflective vest over dark clothing. All lights on the motorcycle should be clean and operational, and extra reflectors or reflective tape may be used. The motorcyclist should always ride as if he were invisible. He should always ride on the roadway in a lane position where it is easiest for other road users to see him. The left tire track of an automobile is often recommended as the best path in most traffic situations. If following a vehicle, a cyclist should ride where he can see the driver in the vehicle's rear vision mirror. Signals should be used every time a turn or lane change is planned. Flashing the brakelight on and off can be an effective way to indicate an intention to slow down or stop. The horn should be used whenever the motorcyclist has doubts about the intentions of other drivers, pedestrians, or bicyclists.

Transport Canada, Road Safety, Place DeVille, Ottawa, Ont., KIA ON5 Canada
Rept. No. TP-1604 ; 4p
Availability: Corporate author

HS-027 499

VEHICLE FUEL ECONOMY REVIEW

From 1974 through 1978, the sales-weighted average fuel economy of new General Motors cars has been steadily increasing. The 1978 fleet average fuel economy is forecast at about 19.0 mpg, or 58% above the 12 mpg figure for 1974. GM expects to meet 1979 and 1980 model year fuel economy standards (19 mpg and 20 mpg, respectively) by extension of its weight-saving program (downsizing), along with emission control and engine improvements, and further use of smaller displacement engines. Between 1980 and 1985 (the standards increasing from 20 mpg to 27.5 mpg), GM cars will have to be redesigned to lose another sizable increment of weight. Substitution of lightweight materials and designs will be utilized to a greater extent. To meet 1980 and 1981 emission control standards, GM has developed the Phase II electronic emission control system. Other areas being pursued in the area of fuel economy are improved engine efficiency, reduced engine size, decreased tire rolling resistance, improved aerodynamics, improved automatic transmissions, and electronic engine controls. GM also has an intensive program directed at application of the diesel engine to passenger cars, to take advantage of its inherently better fuel economy. Progress in electric vehicles includes development of various batteries, notably the zinc-nickel oxide battery, as possible replacements for the conventional lead-acid type.

by G. F. Stofflet
General Motors Corp., Warren, Mich. 48090
Rept. No. GM-4GFS/0607/1 ; 1978 ; 20p
Presented at 15th Annual Economic Outlook Conference, Chicago, 20 Jun 1978.
Availability: General Motors Technical Library, ID-313 RMB, Warren, Mich. 48090

HS-027 500

PASSIVE RESTRAINTS ARE CALLED ANSWER FOR THOSE PEOPLE WHO WON'T BUCKLE UP

The first of two basic types of automatic restraint systems in the U.S. is a safety belt system which is designed to move into place as each front seat occupant enters the vehicle and closes the door. These passive belts, which are available on some cars such as the Deluxe Volkswagen Rabbit and the 1979 General Motors Chevette, require no action on the part of the occupant. Most of these systems have a single diagonal belt (with emergency release) which fits across the chest, plus a padded knee bolster below the dashboard. Some also have an active lap belt. The second type of passive restraint is the air cushion system (ACS), or air bag. This system comprises a sensor in front bumper area (and sometimes a second one on the firewall); a passenger air bag and inflator on the right of the dashboard; a driver air bag/inflator in the steering-wheel hub; and padded or inflatable knee restraints for driver and passenger. Active lap belts will still be required for use with child restraints. An air bag, once inflated in a crash, cannot be reused. Current cost estimates for the air bag system are $100 to $150 above the present cost of safety shoulder belts. The ACS system is expected to be so reliable that the average driver would never experience an inadvertent air bag deployment. In the many years of testing air bags and with 385 known crashes involving air bags, none has failed to inflate. The use of lap belts is recommended with passive restraints to provide additional protection in nonfrontal crashes such as rollovers.

Publ: Missouri Highway Safety Reporter v12 n2 p1, 3 (Feb 1979)
1979 ; 1ref
Availability: See publication

HS-027 501

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)

A detailed presentation is given of the record establishing the prevalence of unfair or deceptive acts or practices by dealers involved in the sale of used motor vehicles. These practices violate Section 5 of the Federal Trade Commission Act. The following areas are individually discussed: defects; warranties;

prior repairs; prior use; odometers; and make, model, year, vehicle identification number (VIN), and seller. Unfair practices and the legal authority to act against them, alternative remedies and their rationale, the economic effect of the recommended rule (including costs and benefits), and the relationship of the remedy to state and local law are discussed. The rule being recommended would require the posting of a window form on all "used vehicles" sold by "dealers" to "consumers" as those terms are defined in the rule. The window form would disclose, in plain English, information relevant to the purchase decision regarding the condition of the car, the terms of any warranty, the availability of a service contract, prior use(s), mileage, and the name of the person who will settle complaints after sale. In addition, the name and address of the seller and the vehicle make, model, model year, and VIN are disclosed. The rule also has provisions relating to the sales contract, oral statements contrary to rule disclosures, dealer-to-dealer disclosures, record-keeping, foreign language disclosures, and standards for inspecting a vehicle for defects.

by Lawrence Kanter, ed.
Bureau of Consumer Protection, Washington, D.C.
1978 ; 646p refs
Availability: Corporate author

HS-027 502

VEHICLE NOISE AND THE PASSENGER

Field and laboratory research into occupants' subjective response to in-vehicle noise of passenger cars and heavy goods vehicles (commercial trucks) is reported. The importance of very low frequencies for passenger comfort, as well as the difficulties of accurately reproducing in-vehicle noise in the laboratory are noted. While the principal indicator of the noise in the vehicle is certainly the dB(A) level, the rate of increase of noise with road speed has a bearing on subjective response. The possibility is raised of determining the subjective response to in-vehicle noise by two parameters: the slope of the noise level (dB(A)/Kmh or mph) and the intercept. Considerable evidence exists that currently accepted noise levels in passenger cars and trucks are unacceptable to passenger comfort and probably to optimum driver performance. One reason for lack of improvement is considered to be a lack of criteria for acceptable noise levels. A subjective rating scheme of in-vehicle noise, from quiet (67 dB(A)) to very annoying (91 dB(A)), is tentatively proposed.

by M. E. Bryan; W. Tempest; D. Williams
Publ: Applied Ergonomics v9 n3 p151-4 (Sep 1978)
1978 ; 9refs
At head of title: Ergonomics for Passenger Comfort.
Availability: See publication

HS-027 503

BUMPER IMPACTS STUDIED VIA COMPUTER

Computer programs have been developed at Ford Motor Co. to permit evaluation of permanent deflection and denting of automobile bumpers. Using simplified, idealized bumper sections, informed selection from groups of proposed designs is possible at low cost. Test results show good agreement with analytical predictions. Computer programs were run, plotting load and absorbed energy vs. maximum deflection. The best bumper section absorbs the most energy for a given deflection and does not have a widely extended flat portion in its load-deflection curve. Analysis indicates that of three idealized bumpers tested (flat, convex, and concave), those having concave front faces are generally less subject to damage during low speed impact. When actually designing a bumper, factors such as protection for body panels and lamps, styling, package, bumper weight, and surface durability must also be considered.

Publ: Automotive Engineering v87 n10 p59-63 (Oct 1979)
1979
Based on SAE-790991, "Computer Modeling of Bumper Impact Resistance," by S. C. Tang.
Availability: See publication

HS-027 504

OCCUPANT-VS-AIRBAG FORCES MEASURED

General Motors researchers conducted static and dynamic tests to investigate the interactive forces between driver surrogates (GM hybrid III anthropomorphic dummy) and the GM air cushion restraint system (ACRS). The driver air cushion module, steering wheel with energy-absorbing column, and associated mounting brackets were used in the test. The crash sensor was not included because the modules were activated remotely. The magnitude of the peak interactive force was found to be an inverse function of the initial separation distance between driver and air cushion in both body block and dummy tests. The peak chest compression occurred when the dummy's chest was against the ACRS module at the initiation of cushion inflation for both static and dynamic test modes and at delayed inflation in the dynamic test mode. Lower magnitudes of chest compression were observed in similar test environments when the cushion was not inflated with the dummy prepostured against the steering wheel or permitted to articulate forward of the upright position. The lowest magnitude of chest compression was observed in a test with the dummy in the upright seated position in which the cushion was inflated before the dummy became significantly involved.

Publ: Automotive Engineering v87 n10 p67-9 (Oct 1979)
1979
Based on SAE-791029, "A Study of Driver Interactions With An Inflating Air Cushion," by John D. Horsch and Clyde C. Culver.
Availability: See publication

HS-027 505

COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)

Computer-aided engineering (CAE) was used to evaluate use of alternative materials for optimizing an existing dual-service station wagon tailgate design. The example deals primarily with the design, analysis, and test functions for structures applications, although the general CAE matrix includes other applications in other design phases. Starting with a steel tailgate design, finite element analyses were conducted to study alternative designs maximizing benefits of aluminum, steel, and fiber-reinforced plastic (FRP). Tradeoffs among yield, stiffness, and cost were investigated. Deflections and expense ruled out aluminum configurations, but the initial unit could be redesigned in high strength steel with a 25% weight and possible 10% cost saving. A preferred solution yielded an FRP unit using only two major component parts, saving 35% in weight and costing about 15% more. Weight became the comparison basis, as this was assumed to provide improved fuel economy and more efficient energy use.

Publ: Automotive Engineering v87 n10 p72-9 (Oct 1979)
1979
Based on SAE-790984, "Lightweight Component Design via Computer-Aided Engineering," by G. D. Angus and Kenneth C. Maddux.
Availability: See publication

HS-027 506

DIESEL-STIRLING COMBINATION MAY IMPROVE EFFICIENCY

One diesel specialist expects improved injector designs to couple with silicon-based materials in advancing a small adiabatic diesel engine with reduced emissions. Absence of many cooling-related devices and higher exhaust gas temperatures may make higher thermal efficiencies possible through exhaust-heated Stirling engine applications downstream. An adiabatic diesel's exhaust will be hot enough for the hydrogen-charged Stirling's needs under most operating modes. Since much of the complication, size, and cost of a Stirling engine are in its combustion system, using the diesel's exhaust heat could greatly simplify that engine's design. Use of a heat storage system between the two engines is an interesting possibility. For maintenance of a minimum level in the heat storage, diesel exhaust would be bypassed when it dropped to a preselected minimum. By providing a heat storage of some rational size, surplus energy could be stored and the vehicle operated for limited time periods by the Stirling engine alone. Another approach would be an electric heater in the heat storage, charging it from the power supply, or use of an expander to drive a generator powered by surplus exhaust energy. An air-to-air intercooler will be required for the diesel's combustion air, and liquid cooling for the Stirling's cooler tubes. If recovery of one-third of the diesel's exhaust energy by the Stirling is assumed, a brake thermal efficiency of 60% could be achieved. With such an engine combination, substantial weight reduction in both the powerplant and fuel tank could be realized.

Publ: Automotive Engineering v87 n10 p90-3 (Oct 1979)
1979
Based on SAE-790807, "Diesel Engine Design Concepts for the 1980's," by K. L. Hulsing (in SAE-SP-446).
Availability: See publication

HS-027 507

FATIGUE RESISTANCE TESTING AND FORECASTING

Seven papers are compiled covering various aspects of fatigue resistance testing and forecasting: fatigue crack initiation and growth analysis for structures; shot peening; strain-life technique in fatigue design; a unified predictive technique for fatigue resistance of cast ferrous-based metals and high hardness wrought steels; bearing life expenditure during running-in; equipment selection for failure analysis; and post-processing graphics for brittle failure analysis.

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-448 ; 1979 ; 86p refs
Includes HS-027 508--HS-027 514.
Availability: SAE

HS-027 508

FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES

The nature of the fatigue process is outlined with fatigue considered as a consequence of cyclic plasticity and local stress and strain as the parameters for fatigue damage analysis. The state of the art of fatigue analysis of structural components is discussed, including the principles of various analytical methods. The similitude requirements are addressed which enable component life predictions to be made on the basis of laboratory data from small specimens. The problem of crack growth prediction is briefly considered. Various studies applying crack nucleation and growth analyses to the prediction of weld life are reviewed. Although significant progress has been made in fatigue analysis, it is realized that the accuracy of predictions is still limited.

by D. Broek; B. N. Leis
Battelle Columbus Labs., Columbus, Ohio
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p1-12
Rept. No. SAE-790511 ; 1979 ; 40refs
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 507

HS-027 509

SHOT PEENING--AN ADDED DIMENSION

The development of shot peening is outlined as a practical tool to improve the quality of metal parts and structures without increasing size or weight. The process consists of cold working a surface by bombarding it with steel balls and leaving a layer of compressive forces in it. Parameters of the peening operation are discussed: size and velocity of shot, arc height (and Almen strips), coverage, and time. It is noted that the critical factors are built into a modern shot peening machine and are not determined by the operator. Peening applications are discussed. The majority involve increasing the fatigue life of a part, while lesser known ones include the elimination of stress corrosion cracking in aircraft parts. Special mention is made of designing equipment around the benefits of shot peening, as in the case o the single leaf spring used on several modern automobiles. Residual compressive forces imparted by shot peening cancel o minimize the tensile forces caused by service. Additional benefi is obtained by the stress peening process, wherein the part i preloaded as it would be in service, held in that position while peening, and then released. The compressive forces are thereby driven deeper into the surface of the spring.

by F. K. Baldauf
Wheelabrator-Frye, Inc.
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p13-8
Rept. No. SAE-790513 ; 1979
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 507

HS-027 510

SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN

The use of the strain-life technique in designing for finite fatigu life is discussed. The technique can be used for both low an high cycle fatigue analysis. The difference in mathematical form of the cyclic stress-strain curve and hysteresis loops is explained

The forms are the same except for a factor of 2 in both stress and strain. Examples are given to illustrate that stronger materials are not necessarily better for fatigue resistance. Stronger materials are better for high cycle fatigue, whereas ductile materials are better for low cycle fatigue. The importance is emphasized of knowing the actual operating conditions of components and structures in designing for finite life. Conditions are derived under which the strain-life and fatigue notch factor-nominal stress range methods yield the same results. A list of materials which satisfy these conditions is included.

by T. V. Seshadri; Phil R. Pierce
Fruehauf Corp., Res. and Devel. Div.
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p19-30
Rept. No. SAE-790889 ; 1979 ; 3refs
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 507

HS-027 511

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS

For each of four ferrous-based systems, it is shown that the initiation of fatigue cracks occurs at the tips of microdiscontinuities normal to applied stress under cyclic loading. These disruptions in an otherwise homogeneous steel matrix act as strain and stress concentrators and may be considered from a mechanics viewpoint. The disruptions include graphite flakes in gray cast iron, graphite spherulites in nodular cast iron, gas pores, microshrinkage cavities and inclusions in cast steels, and inclusions in high hardness wrought steels. The four systems exhibit a commonality in that the size and shape of the smallest discontinuity, as well as the strength and ductility of the matrix, govern fatigue resistance. A unified predictive technique for fatigue life is presented which accounts for size effect and plasticity at the tips of the discontinuities (treated as notches). This technique provides an accurate description of the low cycle fatigue resistance and long life fatigue strength of the four ferrous-based systems. Additional research is suggested: extension of the study to nonferrous systems, development of improved (controlled) casting techniques, and application of the predictive technique to other conditions (e.g. cumulative damage analyses).

by M. R. Mitchell
University of Illinois, H. F. Moore Res. Lab., Urbana, Ill.
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p31-66
Rept. No. SAE-790890; FCP-23 ; 1979 ; 109refs
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979. Research sponsored by Univ. of Illinois through the Fracture Control Prog.
Availability: In HS-027 507

HS-027 512

BEARING LIFE EXPENDITURE DURING RUNNING-IN

Experimental results are presented showing that total bearing wear during running-in (i.e. initial operating period of new machine to reach steady-state friction/wear characteristics), as well as running-in distance, depend on the initial roughness of the journal. Curves based on these results are plotted, which provide a measure of the bearing life expenditure for running-in, and which can be used to obtain optimum values of journal roughness for minimizing this expenditure.

by G. Massouros; A. Dimarogonas
University of Patras, School of Engineering, Patras, Greece
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p67-9
Rept. No. SAE-790892 ; 1979 ; 9refs
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 507

HS-027 513

SELECTING EQUIPMENT FOR FAILURE ANALYSIS

Guidelines are provided to aid the field test engineer in determining whether a failed part should be analyzed immediately or returned to the laboratory for analysis. The following six major types of tools used in a failure analysis laboratory are discussed in terms of their most frequent uses: visual, mechanical, optical, chemical, electron, and X-ray. A chart denotes methods of analysis, tools available, and information obtained. Types of equipment are tabulated which are most commonly used for analysis in the four major failure types (yielding, fracture, corrosion, and wear). The availability of resources (time, money, personnel) and the need for proof of accuracy of results are mentioned as factors in equipment purchase. The protection of failed parts during transport to the laboratory is addressed.

by Bruce E. Boardman
Deere and Co.
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p71-6
Rept. No. SAE-790893 ; 1979 ; 15refs
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 507

HS-027 514

POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS

Using a fracture analysis diagram as the failure criterion, a finite element post-processing scheme is presented as a tool for the analysis of plate structures for brittle failure. The diagram is indexed to the nil-ductility temperature, a material dependent parameter. The dynamic tear test is also used in establishing the diagram. Stress, temperature, and material type information is transferred to the post-processor. Using this information, the processor retrieves the appropriate toughness information from a data file. The stress and temperature data are transformed to an allowable flaw size. The processor prepares the contour of the plate structure on the terminal screen and then maps the allowable flaw sizes as contours onto this outline of the structure. The effectiveness of this approach is illustrated with two examples.

by M. S. Brueggert
John Deere Product Engineering Center, Waterloo, Iowa
Publ: HS-027 507 (SAE-SP-448), "Fatigue Resistance Testing and Forecasting," Warrendale, Pa., 1979 p77-81
Rept. No. SAE-790894 ; 1979 ; 4refs
Presented at SAE Off-Highway Vehicle Meeting and Exposition, Milwaukee, 10-13 Sep 1979.
Availability: In HS-027 507

HS-027 515

ENGINE TECHNOLOGY FOR THE 1980'S. ENGINEERING KNOW-HOW IN ENGINE DESIGN, PT. 27

Four papers are compiled on the following topics: diesel engine design concepts and manufacturing, the utilization of computers in engine design, the petroleum supply and demand picture, and the fuel requirements for various types of engines.

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096
Rept. No. SAE-SP-446 ; 1979 ; 54p refs
Includes HS-027 516--HS-027 519.
Availability: SAE

HS-027 516

DIESEL ENGINE DESIGN CONCEPTS FOR THE 1980'S

The differential needle valve nozzle types used on most current diesel engines are discussed in terms of their mechanical limitations. A variable area orifice nozzle is proposed to overcome these shortcomings, resulting in improved fuel atomization and distribution. This design should allow the diesel to realize its full potential of lower emissions, improved combustion, easier starting, and greater air utilization in open chamber, high-speed designs. Some comments are made on air utilization by the diesel engine, noting that engine performance can be improved through close attention to the effect of nominal compression ratio on trapped cylinder volume, surface/volume ratio, and ratio loss. Two adiabatic diesel engine design concepts that have the potential for much lower specific fuel consumption are discussed: turbocharged two-cycle diesel and diesel-Stirling thermal engine combination. It is concluded that the successful development of a small adiabatic design, open chamber, direct injection diesel utilizing exhaust energy recovery, equipped with the proposed nozzle design could provide more than 50 mpg on diesel fuel powering a 4500 lb car, giving adequate performance with 185 hp and lower emissions.

by K. L. Hulsing
Publ: HS-027 515 (SAE-SP-446), "Engine Technology for the 1980's. Engineering Know-How in Engine Design, Pt. 27,"
Warrendale, Pa., 1979 p1-14
Rept. No. SAE-790807 ; 1979 ; 22refs
Presented at SAE 27th Annual Milwaukee Lecture Series, 29 Mar-26 Apr 1979.
Availability: In HS-027 515

HS-027 517

DIESEL ENGINE MANUFACTURING IN THE 1980'S

A successful diesel engine manufacturing operation in the 1980's requires a close working relationship between product and manufacturing groups, and a total system integration of manufacturing facilities. To design and develop engines which meet product demand and which include appropriate advanced technologies require a strong positive relationship between product and manufacturing engineers. This cooperative effort starts with the initial concept and continues through prototype development, resulting in a more cost-effective product and reduced development times and costs. Manufacturing engineers are responsible for system integration which involves organizing new manufacturing elements on a system basis, evaluating and modifying existing systems for optimum effectiveness and linking new and existing systems for factory-wide integration. The major areas of system integration are asset utilization, group technology, ma
facturing systems, simulation, preventive maintenance, and
ployee training.

by Robert Maller
Deere and Co.
Publ: HS-027 515 (SAE-SP-446), "Engine Technology for the
1980's. Engineering Know-How in Engine Design, Pt. 27,"
Warrendale, Pa., 1979 p15-8
Rept. No. SAE-790808 ; 1979
Presented at SAE 27th Annual Milwaukee Lecture Series, 29
Mar-26 Apr 1979.
Availability: In HS-027 515

HS-027 518

COMPUTERS IN ENGINE DESIGN

The variety of computer applications as engineering tools
automotive engine design is discussed. Computing equipm
typically used by design personnel are described: hand-held
desk-top calculators, desk-top computers, minicomputers,
mainframe computers (and associated terminals for remote
entry, interactive time-sharing, and interactive graphics). Co
puting as part of the solution, never as part of the problem,
stated as a design office computing philosophy. A novel
proach to computer usage in the conceptual stage of eng
design is outlined. In the actual design phase, most compu
use occurs in design analysis and performance simulation, p
ticularly in the following tasks: cycle simulation, design of f
injection systems and bearings, and analytical stress analy
The development stage, wherein the principal activity is testi
prototype hardware is discussed in terms of computer use
laboratory and field data acquisition. The computer as a vi
factor in productivity improvement is noted; overall design p
ductivity increases of 5:1 are commonly reported.

by Kenneth H. Huebner
John Deere Product Engineering Center
Publ: HS-027 515 (SAE-SP-446), "Engine Technology for the
1980's. Engineering Know-How in Engine Design, Pt. 27,"
Warrendale, Pa., 1979 p19-30
Rept. No. SAE-790810 ; 1979 ; 4refs
Presented at SAE 27th Annual Milwaukee Lecture Series, 29
Mar-26 Apr 1979.
Availability: In HS-027 515

HS-027 519

AUTOMOTIVE FUELS FOR THE 1980'S

Data are reviewed on the past, present, and projected futu
energy situation: energy consumption by end use and by sour
in the U.S., oil consumption by end use and by transport mo
in the U.S., and world oil supply. The end products from
barrel of crude oil, and proven and recoverable world crude
reserves are considered. In particular, 71% of all energy used
U.S. transportation is consumed by gasoline engines, represen
ing 20% of total energy consumption. Motor gasoline accoun
for the largest share of the crude oil barrel, or 39%. In the lo
run, energy-efficient vehicles must be designed with engin
tolerant of a wider range of fuel characteristics. Since futu
transportation fuels will be produced from sources other th
crude oil, their compatibility with future engines must be a
sured. In this light, current fuel requirements for spark igniti
engines are discussed in terms of volatility and octane requir
ment. Options available to the engine designer to impro
engine fuel tolerance are reviewed (e.g. combustion chamb
configuration, electronic ignition timing). The Ford Pr
grammed Combustion Process Combustion Chamber design

cited as an example of a fuel-efficient, high compression ratio engine with a modest octane requirement. It is a direct cylinder injection, stratified charge engine. Diesel fuel requirements (low contamination, apprpriate cetane rating, cloud point, sulfur content, flow properties) are discussed and exhaust emission standards are mentioned as the determinant of the diesel engine's future. Of internal combustion engines suitable for surface transportation, the gas turbine is cited as tolerating the broadest range of fuels, although fuel economy improvement awaits new turbine materials technology.

by R. L. Courtney; H. K. Newhall
Chevron Res. Co., Richmond, Calif.
Publ: HS-027 515 (SAE-SP-446), "Engine Technology for the 1980's. Engineering Know-How in Engine Design, Pt. 27," Warrendale, Pa., 1979 p31-48
Rept. No. SAE-790809 ; 1979 ; 14refs
Presented at SAE 27th Annual Milwaukee Lecture Series, 29 Mar-26 Apr 1979.
Availability: In HS-027 515

HS-028 380

DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT

Four tests were constructed to evaluate driver education students or programs in achieving or providing driving knowledge, driving performance, good driving attitudes, and driving aptitudes. For knowledge, performance, and aptitude tests, validity was measured by the ability of each test to discriminate student drivers from professional fleet drivers. For the attitude test, validity was measured by the ability of the test to discriminate students from ordinary experienced drivers and from experienced drivers with accident records. The tests cover a range of driving-related skills and knowledge; all four tests exceed standards of acceptable validity and reliability as defined by testing literature and industrial usage. The tests are useful as intermediate instruments for evaluating driver education (individual students or groups of students from different programs). A detailed description of each test encompasses test administration and practical limitations, validity analysis and establishment, and relilability analysis and establishment. Supporting data and references are provided. A driver information sheet is appended.

by Ray Engel; Sylvia Paskaruk; Nancy Green
Peat Marwick and Partners
Rept. No. TP-2467; CR-7905 ; 1979 ; 72p 15refs
Availability: Ministry of Transport, Road and Motor Vehicle Traffic Safety Branch, Ottawa, Ont., K1A ON5 Canada

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HS-028 381

CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE

A study of 89 motor vehicle occupant deaths in Maryland among children less than 15 years of age compared these fatalities in terms of factors generally associated with greater risk of injury or death. Exposure factors were considered by comparing children killed in crashes with all children in Maryland crashes reported to the police. Data extracted from postmortem records (1973-1977) and state police accident reports concerned age, restraint use, seating position, injury description, and crash circumstances. Similar data for 1977 were determined from tabulations of the Maryland Automated Accident Reporting System. Of 89 children killed, 38 or 43% were less than 5 years old. The occupant death rate, estimated from 1973-1977 deaths and 1977 crash data, was 6.4 per 1000 ocupants for children less than 1 year old and 1.0 per 1000 for other children. Most children traveled completely unrestrained; 55% rode in the vehicle's front seat; and all deaths resulted from impact injuries except for three children who died in fires caused by the crash. Serious head injuries were sustained by at least 66 children and were most common in children less than 2 years of age. Fifty-four children died at the crash scene or were dead on arrival at the hospital. Crashes between noon and 6 P.M. dominated for children under 1 year. Among older children, crashes between 6 P.M. Friday and Sunday midnight predominated. Ejection from the vehicle was least common in children under 1 year. Ninety percent of all children less than 10 years old and 50% of older children were killed in multiple vehicle crashes. Study results are consistent with national data showing that occupant death rates for preteenage years are highest in the first year of life and that the median age at death during this year is four months. The findings indicate the potential value of head protection for young children, and the greater value of restraint systems for all occupants. Restraint use by young children was estimated as 25% of adult use in the same vehicle. The need for automatic crash protection is emphasized.

by Jerome J. Karwacki, Jr.; Susan P. Baker
Publ: Journal of the American Medical Association v242 n26 p2848-51 (28 Dec 1979)
1979 ; 20refs
Sponsored in part by the Insurance Inst. for Hwy. Safety and the Maryland Medical-Legal Foundation.
Availability: See publication

HS-028 382

ACCIDENT RESEARCH MANUAL. FINAL REPORT

Techniques are compiled for use by engineers/analysis in carrying out highway accident research. Many highway safety research studies are inadequate due to erroneous conclusions or lack of conclusive evidence. The accident research manual contains materials on: rationale of and need for improving the level of existing research; issues with which researchers must be familiar; components and methodologies used in basic accident research types (research to evaluate countermeasures and to identify and examine relationships between accidents and other highway factors); preparation and distribution of research results; and guidelines for engineer/analysts to use in research. The manual is designed for use in classroom training, as a reference text, and/or in self-study programs. Review questions, self-study tests, and references to relevant texts and articles are included.

by Forrest M. Council; Donald W. Reinfurt; B. J. Cambell; Frank L. Roediger; Carol L. Carroll; Amitabh K. Dutt; Janet R. Dunham
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
DOT-FH-11-9424
1980 ; 147p refs
Availability: NTIS

HS-028 383

SEAT-BELTS. A STUDY OF THEIR EFFECT ON 3,000 ACCIDENTS

Statistics from a study of 3,138 cars involved in accidents are presented. In a sample of 1,624 persons wearing seat belts, 3% were killed in accidents, 7% were heavily injured, 55% were slightly injured, and 35% were uninjured; of the 3,242 individuals without seat belts, 7% were killed, 12% were heavily injured, 63% were slightly injured, and 18% were uninjured. Seat belts provide two kinds of protection: preventing ejection from the vehicle; and keeping the person from hitting against interior car parts (secondary collision). In head-on collisions, 6.2 of every 1,000 people riding in the front seat without a seat belt are killed by ejection. Passengers are better protected by seat belts than drivers since drivers tend to hit the steering wheel and steering mechanism. Of all body parts, the head is most protected by seat belts. Supporting data and illustrations are provided.

Publ: Prevention Routiere International n8 p14-6 (4th Quarter 1979)
1979
Based on a study conducted by Peugeot-Renault's Physiology and Biomechanics Laboratory and the Raymond Poincare Hospital of Garches (France).
Availability: See publication

HS-028 384

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE

Ways in which Congress could strengthen the Federal role in reducing consumer auto repair problems were explored in an investigation by the General Accounting Office (GAO), involving consultation with officials and review of programs of 11 Federal agencies, seven states, four U.S. auto manufacturers, and several other industry and consumer groups. Questionnaire returns were also received from over 250 government and industry officials. Auto repair was identified as a major consumer problem. Consumers were bothered by faulty and unnecessary repairs, and unanticipated repair costs. Government officials viewed auto repair problems as serious, expensive, and persistent although industrial officials believed that these problems were exaggerated. It was determined that problems are partially caused by a shortage of skilled mechanics and by questionable business practices. It was also determined that state and industry efforts to minimize auto repair problems must be evaluated. Consumer information and education programs are recommended, as well as dispute resolution programs. Mechanic competency and industry repair practices must receive increased attention. State and local officials feel that their regulatory authority may be too limited. Federal involvement in the auto repair problem is mostly indirect, and Federal activities have had minimal effect. State and local government officials see a need for some Federal involvement. An interagency coordinating committee is a step toward a national program dealing with auto repair problems.

by Elmer B. Staats
General Accounting Office, Office of the Comptroller General, Washington, D.C. 20548
Rept. No. HRD-80-30 ; 1980 ; 174p refs
Availability: General Accounting Office, Distribution Section, Room 1518, 441 G St., N.W., Washington, D.C. 20548

HS-028 385

MOTORCYCLE ACCIDENT INVESTIGATION 1975, 1976, 1977, 1978. A FOUR YEAR ANALYSIS OF MOTORCYCLE SAFETY IN UTAH

Circumstances influencing motorcycle safety in Utah from 1975 through 1978 are analyzed. A seven-phase countermeasure program was initiated to deal with motorcycle crashes. After evaluation, four countermeasures were retained: enforcement, pub
information, legislation, and problem identification. The othe
driver education, driver licensing, and judicial, were either d
continued or merged into other general problem areas. T
issue of major concern to the state is the value of protecti
headgear in motorcycle crashes. The value of safety helmets
specifically equated with their role in preventing head injuri
helmets do not curtail motorcycle crashes. In the analysis
1975-1978 motorcycle fatalities, a majority of drivers not we
ing helmets died of head injuries; of drivers who wore helme
fewer died from this cause. Rates of helmet use decreased fr
about 78% in 1975-1976 to about 34% in 1977-1978 as a res
of amendments to Utah's helmet use law during 1977. Effects
decreased helmet use may be reflected in the increased he
injuries in 1977-1978 data. The most significant factor related
motorcycle crashes is speed, followed by reckless driving
drinking. Motorcycle size and motorcycle driving experie
are also important.

by Robert F. Parenti; Stephen W. Glines
Utah Dept. of Public Safety, Hwy. Safety Div.
1979 ; 51p
Availability: Corporate author

HS-028 386

STIRLING ENGINES FOR AUTOMOBILES

The ability of the Stirling engine to meet low-cost mass prod
tion, high efficiency, low emission, extensive low part po
operation, and fast response requirements is assessed. Since
Stirling engine is relatively undeveloped with no base of
duction engine experience for any application, the Ford Mo
Co., funded by the Department of Energy, initiated work
1977 to establish the fuel economy potential of the Stirl
engine in the automobile. As of September 1978, Ford proj
a fuel economy improvement of 38-81% beyond that of
baseline spark ignition engine of the same class and perfo
ance. The two most significant improvements relate to en
reoptimization, including improved efficiency in the low-po
operating region, and to power control system modification
appears that a 50-60% improvement in metro-highway
economy is a reasonable goal for the automobile Stirling eng
Key technology needs include low-cost high-temperature m
alloys for heater heads and long-life low-leakage shaft s
Current Stirling engine development efforts are being condu
by a team consisting of Mechanical Technology Inc., Un
Stirling of Sweden, and AM General.

by Donald G. Beremand
National Aeronautics and Space Administration, Lewis Res. Center, Cleveland, Ohio 44135
IA-EC-77-A-31-1040
Rept. No. DOE/NASA/1040-79/7; NASA-TM-79222; E-11
1979 ; 14p 4refs
Prepared for International Conference on Energy Use Management, Los Angeles, 22-26 Oct, 1979.
Availability: NTIS

HS-028 387

THE EFFECTIVENESS OF ACCREDITED TRAFF VIOLATOR SCHOOLS IN REDUCING ACCIDEN AND VIOLATIONS

The California State Legislature enacted Senate Bill 193 in
requiring the Dept. of Motor Vehicles to establish an accre
tion program for traffic violator (TVS) and driving under
influence schools. The TVS accreditation program was eva
ed using 14,278 convicted violators selected (Aug-Nov

from cooperating courts that assigned violators to traffic schools. Schools were required to complete a coding form for each subject, giving the driver's license number, birth date, school start date, court identification code, and school identification code. Biographical data, three-year prior accidents and countable convictions, subsequent six-month accidents, and six-month total convictions plus failures to appear were obtained from the Dept. of Motor Vehicles' central computer records. Accidents included the total number of fatal/injury and property damage accidents reported by the California Highway Patrol, property damage accidents reported by involved drivers pursuant to California's financial responsibility reporting law, and all known out-of-state accidents. Violators convicted of a nonalcohol-related traffic offense were randomly assigned to groups attending or not attending a TVS. Although some subjects were assigned to the wrong treatment group, both groups were similar in their composition based on sex, age, and prior driving record. To guard against misinterpretation, subsequent accident and conviction data were further analyzed by placing all subjects in the group to which they should have been assigned and by using only schools which had properly assigned subjects. Both analyses confirmed that treatment did not have a significant effect on subsequent six-month accidents or convictions. No evidence was found that treatment had different effects within school types (public versus private or multiple versus single session). Study findings question the efficacy of TVS's. Information on TVS accreditation standards and supplementary study data are appended.

by Raymond C. Peck; Shara Lynn Kelsey; Michael Ratz; Beverly R. Sherman
California Dept. of Motor Vehicles, Sacrament, Calif.
Rept. No. CAL-DMV-RSS-79-71 ; 1979 ; 43p 18refs
Availability: Corporate author

HS-028 388

WHO NEEDS AIR BAGS?

Issues are addressed related to the efficacy and acceptance of air bags in automobiles. Three facts underlie the controversy over air bags: solid data are lacking to support the assumption that air bags will automatically guarantee a high degree of safety to people riding in front seats; air bags are designed to function in head-on or near-frontal crashes, offering little or no protection in side, rear, roll-over, ricocheting, and low-speed accidents; and shoulder harnesses (with lap belts) provide more protection in the full spectrum of accidents than air bags alone and are about the equivalent of air bags and lap belts combined. The National Hwy. Traffic Safety Administration advocates the use of air bags since only one in seven persons uses seat belts. The initial and replacement cost of air bags is much higher than that of seat belts. Passive (automatic) belts require two separate front seats and can be dismantled. Air bag operation is illustrated and explained, studies on the lifesaving potential of air bags are questioned, and cost implications of air bag use are discussed.

by Earl Selby; Miriam Selby
Publ: Reader's Digest v116 n695 p130-3 (Mar 1980)
1980
Availability: See publication

HS-028 389

KILLERS ON THE ROAD

The traffic accident situation in the Philippines is outlined and efforts to reduce such accidents are considered. According to the Constabulary Hwy. Patrol Group, one of the country's traffic law enforcement agencies, 34,612 traffic accidents occurred in 1977 compared with 18,510 in 1976. Nearly 1,000 persons died from traffic accidents in 1977, and more than 11,500 persons were injured. It is estimated that 94 traffic accidents occur daily, or at least one every 15 minutes. An average of three persons die in these accidents, and another three are injured every two hours. Most accidents occur during rush hours from 10 a.m. to 1 p.m. and from 6 p.m. to 8 p.m. The most accident-prone days of the week are Saturday, Sunday and Wednesday. Most accidents involve collisions between two more vehicles. Drunkenness, sleepiness, and physical defects are major accident causes. Another factor is that the number of roads built annually is not commensurate with the number of cars manufactured daily. Some traffic-related agencies blame accidents on lack of traffic signs and traffic control devices to regulate vehicle and pedestrian flow. Compounding the traffic problem is a lack of medical facilities and physicians to treat victims. One physician has proposed the creation of special units in Philippine provincial and regional hospitals to deal exclusively with accident cases. Efforts are being intensified by various organizations and agencies to prevent traffic accidents, including seminars on better driving, research, and the use of junior traffic aides to supervise pedestrian crossings near schools. Laws have been passed to promote accident prevention, but no laws mandate the use of safety belts in cars.

by A. J. Amor
Publ: Journal of Traffic Medicine v7 n4 p61-2 (Dec 1979)
1979
Adapted from World Health, The Magazine of the World Health Organization (Jun 1979).
Availability: See publication

HS-028 390

CRASH PROTECTION IN ROAD ACCIDENTS

Active and passive crash protection in road accidents is examined, with reference to highway safety in developing countries. In general, road accidents consume roughly 1% of the gross national product of most countries, whether industrialized or developing. Due to the relatively great effectiveness of crash protection measures and restraint systems, benefits of their use are likely to outweigh costs. Most road vehicles are passenger cars and the majority of road injuries are to car occupants or pedestrians. In global terms, about 40% of fatalities involve car occupants, 30% involve pedestrians, and 20% involve motorcyclists. Advances have been made in developing countries in the adoption of protective devices and restraint systems. The most significant active crash protection device is the seat belt. Other effective active measures are crash helmets for motorcyclists, and child restraint systems and head restraints for car occupants. Most passive devices are incorporated into the vehicle's basic design, e.g., energy-absorbing instrument panels, anti-intrusion steering assemblies, high penetration-resistant laminated wind screens, antiburst door locks, and improved seat design. The risk of accidents with casualties is considerably higher for mopeds and motorcycles than it is for cars. The importance of public health measures and road safety programs in developing countries is emphasized.

Publ: Journal of Traffic Medicine v7 n4 p66-7 (Dec 1979)
1979
Based on report in WHO Chronicle, n33 p381-2 (1979).
Availability: See publication

HS-028 391

TRANSIT FACT BOOK. 1978-1979 ED.

The 1978 annual summary of trends in U. S. urban mass transportation is presented. Growth in public transportation is projected for the 1980's, particularly in consumer demands for improved services caused by the rapidly changing transportation environment, higher gasoline prices, and public education programs on transit system use. Data on the U.S. transit industry concern the number of operating transit systems, passenger vehicles owned and leased, total operating revenues, linked and unlinked transit passenger trips, estimated passenger and vehicle miles, and energy consumed. Passenger vehicles are classified as heavy and light rail cars, trolley coaches, cable cars, inclined plane cars, aerial tramway cars, motor buses, Automated Guideway Trasit cars, commuter railroad cars, and urban ferry boats. Energy data encompass diesel fuel, gasoline, propane, and electricity. Transit industry trends and issues are explored, and a profile of transit services is provided. A glossary and an index are included.

American Public Transit Assoc., 1225 Connecticut Ave., N.W.,
Suite 200, Washington, D.C. 20036
1979 ; 81p refs
Availability: Corporate author

HS-028 392

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS

General characteristics of off-highway recreational motor vehicles are defined, including industry, market, and owner characteristics; possible fuel conservation options under alternative scenarios; estimated fuel conservation potential; and general recommendations for future fuel conservation programs. The focus is on land-based recreational motor vehicles, recreational motorboats, and general aviation aircraft (single-engine and twin-engine piston). Since conservation efforts directed specifically toward the recreational vehicle sector may not yield a net decline in total energy or even gasoline consumption, it is difficult to establish what leisure time activities are most wasteful of energy. Total land-based recreational motor vehicle gasoline consumption in 1977 was about 1.6% of passenger car consumption and 1.2% of consumption by the entire transportation sector. Improvements in technology and operating-maintenance procedures can reduce fuel consumption. Absolute fuel savings are small compared with projected passenger car fuel savings. Certain market forces, e.g. fuel availability, fuel prices, and general inflation, tend to dampen the acquisition and use of recreational vehicles. Relatively little is known about leisure time tradeoffs with respect to fuel conservation. It is recommended that Federal programs concentrate on educational and promotional activities designed to increase fuel efficiency through improved operating-maintenance procedures; that Federal programs avoid implementing programs which reduce recreational vehicle inventories or use; and that cost be considered in implementing any Federal programs specifically directed toward the recreational vehicle sector. More reliable and definitive industry and consumer data on fuel economy of land-based recreational motor vehicles should be obtained. Fuel conservation options and mechanisms are described, and fuel conservation potential by 1985 is summarized.

by Neil Goldschmidt
Department of Transportation, Office of the Secretary,
Washington, D.C. 20590
1979 ; 115p refs
Availability: Corporate author

HS-028 393

LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS

The actual service fatigue life of notched steel and aluminum specimens was determined using a special testing device installed in a passenger car and operated by a car rear wheel's vertical displacement; specimens were subjected to reversed bending. Service, service duplication, and program fatigue tests were conducted. Random fatigue life curves obtained by service (road) tests, expressing the relation between maximum incremental stress and the number of mean crossings to failure, did not differ significantly form those obtained by service duplication (laboratory) tests when considering scatter in fatigue. There was a tendency toward shorter fatigue life from service tests as opposed to service duplication tests, which may be explained by corrosion in service tests. While road testing took several years to complete under changing environmental conditions, laboratory testing could be carried out without interruption and under constant test conditions. Program fatigue tests, the most frequently used type of simulation for field loading histories, overestimated fatigue life. Results confirmed that valid fatigue life prediction models must account for the sequence of individual peaks and troughs.

by Ernst Gassner; Wilhelm Lipp
Forshungsinstitut der Fraunhofer-Gesellschaft, Laboratorium fur Betriebsfestigkeit, Darmstadt, Federal Republic of Germany
Publ: American Society for Testing and Materials Publication n671, "Service Fatigue Loads Monitoring, Simulation, and Analysis," 1979 p222-39
Rept. No. N79-33497; ICAF-1094 ; 1979 ; 23refs
Availability: See publication

HS-028 394

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW

Available literature is reviewed on auditory effects of wearin hearing protectors. A conceptual model of the perception o auditory signals suggests that three components are importan (audibility, attention demand, and recognition). Several method are compared for predicting the audibility of complex sounds i noise. Limited experimental evidence on auditory effects o wearing hearing protectors is examined within the framework o the perception process conceptual model. The use of hearin protection by people with normal hearing will not have an marked effect on the audibility of sounds in high-level continuous background noise. In intermittent or time-varying noise, th use of hearing protectors may cause a relative disadvantage t the wearer during quieter periods. Inconsistent use of hearin protectors may result in signals being inaudible when subs quently wearing protectors, via a temporary shift in the hearin threshold. It is hypothesized that by damping and changing th spectral character of sounds, hearing protectors may impa their attention demand value and recognition. An evaluation workers who suffer from noise-induced hearing loss indicat that their perceptions of sounds in noise may be governed wh wearing protectors by doubly elevated absolute threshol rather than by masked threshold criteria relevant to colleagu with normal hearing. Response to warning sounds is discusse An informal survey of acoustic warning device manufacture suppliers, and users is appended.

by Peter A. Wilkins; Alan M. Martin
University of Southampton, Inst. of Sound and Vibration Res.
Rept. No. ISVR-TR-98 ; 1978 ; 216p 299refs
Availability: Corporate author

HS-028 395

DIAGNOSTICS OF GEAR ASSEMBLY--A NEW APPROACH USING IMPACT ANALYSIS

A technique employing torsional excitation and an accelerometer fitted to the structure is used to estimate the backlash distribution of gears in mesh. Backlash may arise from misalignment, eccentricity, or casing distortion. Most mechanical systems containing backlash or clearance can be investigated using a simple nonlinear model. In the impact method, by applying constant force excitation to the mass while crossing the clearance, actual impact velocity at contact will be a function of clearance. Thus, to a first order, impact velocity can be estimated by analyzing structural impact acceleration. Application of the proposed technique involving torsional excitation and an accelerometer will result in detailed phase and amplitude information about geometric imperfections in the gear assembly. Phase lags of particular noncircularities can be related to gears in an absolute sense, but amplitude information can only be treated as normalized to the gear itself. Results can then be compared within the gearbox or perhaps for a number of gearboxes. Results can be applied to match circular imperfections of gears to eccentricities of their shaft-bearing mounts in certain cases. Repeated tests for detecting wear throughout the gear system represent another possible application.

by M. F. Ranky
University of Southampton, Inst. of Sound and Vibration Res.
Rept. No. ISVR-TR-100 ; 1978 ; 29p 5refs
Availability: Hungarian Academy of Sciences, Central Res. Inst. for Physics, P.O. Box 49, H-1525 Budapest, Hungary

HS-028 396

PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE

The relationship between perceptual/cognitive skills and driving was investigated by studying 23 persons with brain damage, 8 persons with spinal cord damage, and 10 able-bodied controls. Each subject was evaluated using a battery of perceptual/cognitive tests, a set of driving tests in a parking lot, and actual intraffic driving. Driving performance was significantly correlated with perceptual/cognitive skills. Highest correlations were obtained for a picture completion test, a picture arrangement test, and a motor free visual perception test. Persons with brain damage performed significantly worse than control subjects and people with spinal cord damage on a range of perceptual/cognitive tasks. Persons with brain damage exhibited impaired driving performance compared to that of control subjects and people with spinal cord damage. There was high correlation between subjective evaluation of driving potential by a driver trainer and evaluation of selected driving actions. Findings suggest that perceptual/cognitive tests can be used in screening to detect potentially serious driving-related problems. Data support the hypothesis that brain damage affects perceptual/cognitive skills and, consequently, driving performance. Study forms are appended.

by Michael Sivak; Paul L. Olson; Donald G. Kewman; Hosik Won; Donald L. Henson
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich.
Rept. No. UM-HSRI-80-3 ; 1980 ; 61p 123refs
Sponsored by Dept. of Health, Education, and Welfare.
Availability: Corporate author

HS-028 397

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES

Policy issues are addressed related to compliance testing of vehicle and equipment by the National Hwy. Traffic Safety Administration under Federal Motor Vehicle Safety Standards. Five major topics are explored: extent to which OVSC (Office of Vehicle Safety Compliance) testing policies and procedures enhance prospects for successful litigation; role of the Vehicle Selection Matrix in constructing the test program; the OVSC budget development process; impact of changes in resources spent on vehicle and equipemt testing; and use of acceptance sampling plans as an alternative to current sampling practices. The compliance testing process is briefly described. Acceptance sampling and other statistical approaches to compliance testing are detailed.

by Anthony K. Mason
General Analysis Inc., 5252 Balboa Ave., San Diego, Calif. 92117
1979 ; 48p
Availability: Corporate author

HS-028 502

SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA

A clinical case is reported involving a 65-year old woman who suffered an acute dissection and thrombosis of the abdominal aorta as the result of a lap-type belt injury in an automobile accident. The injury resulted in the first reported case of complete occlusion of the abdominal aorta as the patient died of a myocardial infarction 3-1/2 hours after surgery. Two previously reported cases are reviewed in which lap belt injury resulted in a later diagnosis of partial vascular occlusion. The effect of deceleration forces in an automobile accident upon the circulatory system is hypothesized. As the occupant's body rotates about the axis of the seat belt, the resulting longitudinal deceleration force drives the blood in the dorsal aorta in the cranial direction toward the aortic arch, causing a sudden stretching force upon the abdominal aorta, which is compressed against the spine by the thrust of the seat belt on the abdominal contents. Upon impact and spinal flexion, the abdominal contents are forced into the pelvic cavity and the aortic arch is stretched in the caudal direction. Transverse ruptures, as are reported here, indicate longitudinal tension on the aortic tube. Another mechanism which may be involved in aortic dissection is the immense force of shock waves moving along the aorta. The findings indicate that thorough examination of the abdominal aorta is mandatory at laparotomy, and that patients with lap belt injuries should be followed up after discharge from the hospital.

by Himmet Dajee; I. W. Richardson; Mohan O. Iype
Publ: Surgery v85 n3 p263-7 (Mar 1979)
1979 ; 22refs
Availability: See publication

HS-028 503

PLASTIC GETS TOUGH

Lightweight composite plastics are challenging steel and aluminum in applications ranging from house walls to aircraft wings. One of the major composite discoveries is graphite fiber. Although carbon (or graphite) fiber is expensive, fortunately it can be easily united with common fiberglass, epoxy, or polyester resins, resulting in a product that has the best features of both materials. Among many applications, graphite supercomposites are being used to make lightweight airplane wings (for Marine Corps AV-8B VTOL and Navy Hornet aircraft), filters on communications satellites, and golf clubs. General Electric's new composite, Valox, is being used in the upper housing and handle of hand irons. Du Pont's Zytel ST (Super Tough), a nylon resin, is being stamped into one-piece, five-spoke bicycle wheels. Celanese uses an advanced polymer called Celcon for faucets and bathroom fixtures. Two new composites show particular promise for home construction: Tapecrete (developed by two Canadian engineers), a cement combined with a polymer and reinforced with fiberglass fabric; and Envirez, a fire-resistant, lightweight, fiberglass-reinforced product (PPG Industries). To reduce automobile weight for improved fuel economy, automakers are using more composites and aluminum, as well as high strength steel. Composites, confined until recently to noncritical parts, are now beginning to appear as structural components (e.g. body panels, bumper beams). Celanese and PPG have combined graphite and fiberglass with new resin and new winding techniques to make an automotive driveshaft with twice the strength of steel.

by Robert L. Perry
Publ: Popular Mechanics v153 n2 p110-2, 174-5 (Feb 1980)
1980
Availability: See publication

HS-028 504

WILL THERE EVER BE HAPPINESS IN TIRE LAND?

The combination of high interest rates, high gasoline prices, and a debt-laden public resulted in lower sales of new cars and trucks and replacement tires of all types in the U.S. during 1979. Total passenger car replacement tire shipments from manufacturers to dealers were 12 million units below expected figures in 1979. The domestic manufacturers' plight was further exacerbated by continued growth in the market share of imported or domestically produced Michelin tires. By the second half of 1979, domestic tire manufacturers operated their plants at only 80% of available capacity, compared to well over 90% in the first half of the year. There were numerous plant closings, with more to come to bring supply into balance with anticipated demand. A 4.4% decline in total tire shipments is projected for 1980, with the passenger replacement market dropping 1.8%. Production is expected to fall by 6%. Independent tire dealers will take an increasing share of the total tire and automotive maintenance business in the 1980's. These dealers, as well as the tire manufacturers, will need to consolidate. The tire dealer is advised also to narrow his product line to reduce inventory costs.

by Saul Ludwig
Publ: Modern Tire Dealer v61 n2 p14, 16, 18 (28 Jan 1980)
1980
Availability: See publication

HS-028 505

CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA

For the Milwaukee, Wis. metropolitan area, an analysis wa
made of potential fuel consumption reductions brought about b
reduced delays through traffic engineering techniques or othe
changes that expedite traffic flow, and by reduced congestion c
peak-period traffic through flexible or staggered work hour
An equilibrium traffic assignment algorithm was used to dete
mine speeds and flows on the road network, and a travel-time
fuel-consumption relationship was used to translate the reduc
tions in travel time into reductions in fuel consumption. Actua
travel time and flow data were used to check the results c
traffic assignments. Upper bound figures for reduced fuel con
sumption were estimated to be 4.1% for elimination of conge
tion-related delays and 2.8% for reduction in peak traffic vo
umes. Actual reductions in fuel consumption realized by thes
two approaches would be smaller than these estimates.

by Roger Tobin
Publ: Traffic Engineering and Control v20 n12 p590-2 (Dec 1979)
1979 ; 7refs
Availability: See publication

HS-028 506

DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS

Calculation methods are reviewed which were developed b
various German researchers (including the authors) concernin
traffic flow capacity at priority intersections and the delay c
vehicles on minor roads. A field study is reported which mea
ured the delay times of right- and left-turning minor-road veh
cles on a minute-by-minute basis. These measurements we
made between a point on the approach road, where traffic w
unimpeded by queueing vehicles, and a point beyond the inte
section on the major road, where all vehicles could resume the
free-running speed. The delay time per vehicle was obtained b
subtracting from each travel time an average (theoretical) fre
running time which would be needed if each vehicle could ke
its approach point speed. Measurements confirm the theoretic
research which indicated an increase of delay time under tim
dependent traffic flow compared with steady-state condition

by Hans-Georg Retzko; Ferdinand Tonke
Publ: Traffic Engineering and Control v20 n12 p596-8 (Dec 1979)
1979 ; 14refs
Availability: See publication

HS-028 507

A.C. (ALTERNATING CURRENT) MOTOR CONTROL FOR ADVANCED ELECTRIC VEHICLE

A test-bed research electric vehicle (EV) has been built spec
cally to evaluate new lightweight, high energy density batter
and controlled alternating current (AC) motor drives as re
world EV transmission systems. The batteries are the lead-a
type and the front wheels have static-inverter-powered AC
duction motor drives. A new type of pulse-width-modula
waveform generation system is used, incorporating "electro
gear change," which permits a highly efficient constant-tor
drive to be obtained over the entire speed range of the vehi

A simple analog feedback system restricts induction-motor slip to that giving maximum or "drop-out" torque in both the motoring and regenerative braking modes of motor operation. A range of at least 100 km per charge with a battery cycle life of 1000 cycles is projected for this EV system. An advanced model of the car will soon be completed. Using the same electrical system concept, it will feature rear-wheel drive, four seats, a lightweight structure and an aerodynamic body.

by D. J. Byers
Publ: Electric Vehicle Developments n4 p4-5 (Nov 1979)
1979
Availability: See publication

HS-028 508

INSURANCE FACTS. 1979 ED.

Basic facts and dimensions are presented on the property and liability insurance business in the U.S., including a review of 1978 business. Dollar value of premiums written for the various types of insurance are tabulated for each year from 1954 through 1978. Total of premiums written in 1978 for all types of insurance was approximately $162 billion; purchases increased almost 13%. Automobile insurance is the largest single classification of the property-liability business. The premium volume of approximately $33.2 billion in 1978 was about 9.5% higher than 1977 and more than double that of 1971. Historical data on losses resulting from fires, natural disasters, accidents, and crime are tabulated and discussed. For motor vehicle accidents, data are presented on fatalities and injuries, driver age, repair costs, economic losses, and claim costs. A study by the Insurance Inst. for Hwy. Safety which found that the latest Federal bumper standard had little effect on the vulnerability of 1979 models to costly damage in low-speed impact tests is reported. Background information is presented on determination of insurance rates, automobile financial responsibility laws, no-fault automobile insurance, and insurance regulation (state regulatory authorities listed). National organizations representing or supported by insurance companies are listed, including various state organizations subscribing to Insurance Information Inst. services.

Insurance Information Inst., 110 William St., New York, N.Y. 10038
1979 ; 84p refs
Availability: Corporate author

HS-028 509

EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)

Equations of motion were derived for a rigid axle and an independent wheel suspension, using a fixed vehicle body. The four different road surface irregularity inputs (roughness functions) were two vertical excitations on the left and right sides and associated angular excitations. For excitation of the rigid axle, four other roughness functions were defined: stroke, roll, and in-phase and out-of-phase camber excitations. Required spectral calculations were obtained. Wheel load fluctuations, side forces on the rim, and the total horizontal forces acting on the two wheels of one axle were calculated as a measure of lateral adhesion efficiency on a straight roadway. The benefits of independent wheel suspension systems were demonstrated.

by Manfred Mitschke
Publ: ATZ-Automobiltechnische Zeitschrift v81 n7/8 p341-6 (1979)
1979 ; 24p 9refs
Translated from German (original 6p; translation 18p).
Availability: Reference copy only

HS-028 510

ENERGY POLICY IMPACT EVALUATION

Five papers are compiled which relate to motor vehicle fuel consumption and energy conservation in the U.S. The topics covered include impact assessment of energy conservation policies on transportation demand; energy intensity estimates for urban transportation modes; the dependence of New York State on foreign sources of petroleum products; evaluation of existing data sources for estimating vehicle kilometers traveled and gasoline consumption; and multivariate classification of automobiles using an automobile characteristics data base.

by Susan Singer-Bart, ed.
Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
Rept. No. TRR-726 ; 1979 ; 43p refs
Includes HS-028 511--HS-028 515.
Availability: TRB $3.00

HS-028 511

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND

Seven classes of energy conservation policies are examined: to increase automobile travel cost relative to other travel modes; to limit automobile fuel supply available to travelers; to physically limit automobile use; to change automobile characteristics; to change characteristics of nonautomobile transportation systems; to affect geographic distribution of trip ends; and to attempt to directly change travel patterns. The impact of these policies on trip makers' decisions is assessed in terms of: reduction in travel, change of trip purposes, mode shift, use of more efficient cars, relocation, and peak-hour use shift. The ability of the models traditionally used for forecasting transportation demand to assess the impacts of these policies is examined. Where available modeling devices appear unable to deal with policy effect on overall travel demand and modal choice, preliminary suggestions are made for revisions to the models. Modal shift (i.e. from private to public transportation) is one of the most probable and highly important trip maker responses. More work is required to improve the sensitivity of these mode-choice models to energy conservation policies and to integrate the improved models into the total transportation demand-forecasting process.

by Rasin K. Mufti; Michael J. Munson
Princeton Univ., Princeton, N.J.
Publ: HS-028 510 (TRR-726), "Energy Policy Impact Evaluation," Washington, D.C., 1979 p1-7
1979 ; 12refs
Prepared for presentation at 58th Annual Meeting of Transportation Res. Board. Sponsored by New Jersey Dept. of Transportation and Tri-State Regional Planning Commission.
Availability: In HS-028 510

HS-028 512

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES

Some of the standard methodologies and data sources employed to estimate the energy intensiveness of urban transit modes are reviewed, with emphasis on aggregate statistical measures. A very small repertory of methodologies/sources underlie energy intensity (EI) estimates, and variance among their results is primarily attributable to contradictory load-factor assumptions. EI estimates for bus and rail transit are developed, and the inadequacies of automobile data are discussed. The best evidence available indicates that buses are substantially more energy efficient than heavy rail transit and that existing rail transit systems consume an average of 24% more operating energy per passenger/km than do buses. Modern heavy rail systems consume approximately 100% more energy/passenger km than do buses, not even taking into account the huge construction costs. Light rail systems, on limited evidence, seem to have no advantage over heavy rail in operating energy efficiency, but may offer some savings in construction costs.

by Kenneth Chomitz
University of California, Irvine, Calif.
Publ: HS-028 510 (TRR-726), "Energy Policy Impact Evaluation," Washington, D.C., 1979 p8-14
1979 ; 35refs
Prepared for presentation at 58th Annual Meeting of Transportation Res. Board. Research sponsored by Oak Ridge National Lab.
Availability: In HS-028 510

HS-028 513

FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)

The dependence of New York State on foreign sources of petroleum products is discussed, including direct product imports and imported crude oil that is domestically refined into such products. By use of a generalized allocation procedure that is applicable to all states, the original foreign sources of petroleum products are traced back from major East Coast and Gulf Coast refineries to the particular countries that supplied the imported crude oil. Known imports of refined products are then added to these estimates to obtain estimates of total dependence. Four products are studied: residual oil, distillate, gasoline, and jet fuel. Results show that, overall in 1976, New York is 72% dependent on foreign oil, compared with 43% for the United States. For residual oil, New York is 96% foreign dependent; major suppliers are Caribbean and South American countries, particularly Venezuela, Virgin Islands, and the Netherlands Antilles. For distillate, gasoline, and jet fuel, New York is between 54% and 58% dependent on foreign sources; supplies come mainly from African and Middle Eastern countries, particularly Nigeria, Algeria, and Saudi Arabia. The United States' dependence pattern is similar but less severe and broader in base. Although New York, like many states, gets its oil from many countries, it relies primarily on a relatively small number of suppliers for most of its petroleum products, making it particularly vulnerable to supply curtailments. A number of actions are suggested to broaden New York's base of sources, to cut foreign dependence, and to reduce petroleum use. These include conservation, fuel substitution in industrial and domestic applications, conversion of existing heating systems to non-oil fuels, and improved fuel use in the transportation sector.

by Richard A. Margiotta; Lawrence J. Reilly; David T. Hartgen
New York State Dept. of Transportation, Albany, N.Y.
Publ: HS-028 510 (TRR-726), "Energy Policy Impact Evaluation," Washington, D.C., 1979 p14-8
1979 ; 4refs
Prepared for presentation at 58th Annual Meeting of Transportation Res. Board.
Availability: In HS-028 510

HS-028 514

VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES

Existing data sources for vehicle kilometers traveled (VKM
and gasoline consumption are evaluated. Collection, reporti
consolidation, and estimation procedures are addressed. Si
direct measurement of VKMT has never been made, the ava
ble information consists of indirect estimates based on vari
sets of assumptions. The type of assumptions and the reliabi
of the data determine the models and types of hypotheses t
can be meaningfully tested. Historically, the importance
VKMT accumulation has been directed toward highway pl
ning and has included such areas as traffic density, highv
safety, and other non-energy-related areas. For those efforts,
traffic-counting methodology has been the procedure m
widely used by the individual states to estimate VKMT. Si
the 1973 energy crisis, the Federal Hwy. Administrat
(FHWA) has requested that the states base their estimates
VKMT on average fuel efficiency rated for different veh
classifications. This alternative methodology may be a m
appropriate way to solve energy-related issues, because ene
efficiency is one of the predetermined variables. Fuel consu
tion rates, however, involve many heterogeneous inputs, an
has been difficult to arrive at a meaningful state average for
economy. As the FHWA has not established a specific meth
ology for estimating VKMT or a single procedure for coll
ing, reporting, and consolidating VKMT data, an accurate
reliable estimate of VKMT in the U.S. cannot be obtai

by Leon M. Rudman
Research and Special Programs Administration, Transportati
Systems Center, Cambridge, Mass.
Publ: HS-028 510 (TRR-726), "Energy Polcy Impact Evaluation," Washington, D.C., 1979 p19-28
1979 ; 23refs
Prepared for presentation at 58th Annual Meeting of Transportation Res. Board. Research performed under Automotive Fuel Economy Res. and Analysis Prog.
Availability: In HS-028 510

HS-028 515

MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE

A cluster analysis of 125 models of 1975 automobiles was
ducted in order to aggregate the vehicles into homoger
groups suitable for modeling automobile demand by ve
type. Eight variables extracted from an automobile charac
tics data base developed by the Dept. of Transportation
employed: curb weight, wheelbase, engine displacement, ro
ness, passenger capacity, fuel economy, list price, and powe
weight ratio. Several weighting schemes, two-distance me
and hierarchical as well as nonhierarchical clustering techn
were used. The analysis strongly indicated that two- anc
group configurations were important. Within the six-group
tering, the three groups that had the highest average sea

liter and seats/initial cost comprised more than 80% of 1975 sales. Compared with the Wharton five-group classification used in a recent econometric automobile-demand model, the multivariate clustering did a consistently better job of accounting for the variability of vehicle characteristics.

by Robin Dubin; David L. Greene; Connie Begovich
Johns Hopkins Univ., Dept. of Geography and Environmental Engineering, Baltimore, Md.; Oak Ridge National Lab., Oak Ridge, Tenn.
Publ: HS-028 510 (TRR-726), "Energy Policy Impact Evaluation," Washington, D.C., 1979 p29-37
1979 ; 24refs
Prepared for presentation at 58th Annual Meeting of Transportation Res. Board. Research sponsored by Dept. of Energy.
Availability: In HS-028 510

HS-028 516

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES

The possible effects on the supplies and prices of four basic industrial materials (iron and steel, aluminum, plastics, and rhodium) were never explicitly evaluated by the Federal government before the automobile fuel economy standards were adopted. The standards, enacted to reduce expensive oil imports, may result in increased aluminum imports of greater dollar value than can be saved by reducing oil imports. Thus U.S. balance-of-trade deficit may suffer rather than benefit. To meet fuel economy and air quality standards at the same time, automobile pollution control devices may require more rhodium than will be available and may force the price of this scarce metal drastically higher. Neither of these consequences, which contribute to unstable, inflationary materials markets, was foreseen when the standards were enacted because the government made no systematic appraisal of their impact on materials. On the whole, the complex and competitive relationship among national goals for energy, the environment, and materials has not been recognized in Federal policy formulation. Therefore, a method for resolving policy conflicts is needed, which may be brought to light through coordinated economic and policy analysis.

by Elmer B. Staats
Comptroller General of the United States, Washington, D.C. 20548
Rept. No. GAO-EMD-80-22 ; 1980 ; 45p refs
Availability: General Accounting Office, Distribution Section, Room 1518, 441 G St., N.W., Washington, D.C. 20548

HS-028 517

ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT

Three independent but related studies are compiled on truck conspicuity and truck-car collisions. The first paper, a review of Fatal Accident Reporting System (FARS) data, indicates that most fatal car-into-truck accidents occur during hours of darkness, pointing to a potential lack of nighttime truck conspicuity. The second paper, a review of the literature on conspicuity and retroreflectorization, suggests that retroreflectorization of trucks is likely to increase their nighttime conspicuity. The third paper details an exploratory field study which indicates that conspicuity-enhancing retroreflective treatments applied to the rear and sides of trucks caused drivers to look at trucks more often and at greater distances.

by Paul Green; Michael Kubacki; Paul L. Olson; Michael Sivak
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48109
Rept. No. UM-HSRI-79-92 ; 1980 ; 56p 79refs
Rept. for Jul 1978-Jul 1979. Sponsored by Motor Vehicle Manufacturers Asoc.
Availability: NTIS

HS-028 518

AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS

Results are presented which support the proposition that the growth path for cars per person should be sigmoid with a finite saturation level. The fact that projections of car ownership using the logistic curve have consistently tended to be too high suggests that a sigmoid curve convex, rather than linear, in the "G, C" plane (annual percentage increase in cars per person -- cars per person) might be preferable. An examination of post-war Great Britain data suggests that overpredictions have been the result of inappropriate parameter estimations, not model form. The Regional Hwy. Traffic Model (RHTM) car ownership model gives satisfactory short-term back-predictions, but the use of the "causal" variable "Car Purchasing Income" to achieve a time-stable model presents far greater problems in the forecasting context than the extrapolative models developed at the Transport and Road Res. Lab. Many factors affect car ownership growth and Car Purchasing Income is as much a proxy for these in the RHTM modle as time is in time-trend extrapolative models. Although converting cross-sectionally fitted causal models into predictive ones is desirable, significant problems need to be resolved. The Car Purchasing Income variable is unacceptable on theoretical grounds in that it implies car ownership decisions will be unaffected by changes in the prices of other products which might be purchased instead of a car. It is also unacceptable on practical grounds, in that immediate saturation is predicted if incomes are forecast to increase more slowly than car prices.

by A. S. Fowkes; A. D. Pearman; K. J. Button
University of Leeds, Inst. for Transport Studies, Leeds LS2 9JT, England
Rept. No. ITS-Working-Paper-110 ; 1979 ; 31p 17refs
Research sponsored by Social Science Res. Council (U.K.).
Availability: Corporate author

HS-028 519

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)

A passenger car antiskid system developed by Bosch, called Antiblockiersystem (ABS), prevents wheel lockup and ensures vehicle steerability and stability with shorter stopping distances than are possible with locked-wheel braking on most road surfaces. ABS consists of speed sensors, an electronic control unit, and a hydraulic unit. The front wheels are controlled separately, the rear wheels jointly. For the control process, the two variables "wheel circumferential acceleration" and "wheel slip" are used, offering an optimum brake control cycle even under unfavorable road and driving conditions. The ABS has a sophisticated monitoring feature which checks the electronic system prior to vehicle operation and the major components of the ABS in operation. Once a defect is detected, the ABS is switched off and the normal braking system is utilized.

by Heinz Lieber; Armin Czinczel
Publ: ATZ Automobiltechnische Zeitschrift v81 n11 p569-83 (1979)
1979 ; 25p 6refs
Translated from German (original 7p, translation 18p).
Availability: Reference copy only

HS-028 520

MOTOR TRUCKS OF AMERICA. 1ST ED.

The U.S. trucking industry is chronicled, with major milestones presented for each year from 1895 through 1979. Brief biographical sketches are provided of the outstanding truck pioneers. A roll call lists motor trucks built in the U.S. Some historical statistical data are compiled concerning total factory sales of trucks and buses, registrations and vehicle miles traveled, and special state and Federal truck taxes. A subject index is included (photographs indicated in boldface type).

by James A. Wren; Genevieve J. Wren
Motor Vehicle Manufacturers Assoc. of the U.S., Inc., 300 New Center Bldg., Detroit, Mich. 48202
1979 ; 384p refs
Availability: University of Michigan Press, Ann Arbor, Mich.

HS-028 521

1978 ROADSIDE VEHICLE INSPECTIONS

Results are compliled of the Bureau of Motor Carrier Safety's (BMCS) 27,601 roadside vehicle inspections conducted throughout the U.S. during 1978. The inspection program is designed to identify vehicle defects and driver conditions which could cause accidents, and to remove hazardous vehicles and drivers from the highways. Ninety-four percent (25,965) of all vehicles inspected were operated either by for-hire (authorized or exempt class), private carriers of property, or "other" carriers (e.g. transporting mail, foreign commerce carriers). Forty percent of the property-carrying vehicles were found to have one or more serious mechanical defects which resulted in the vehicle being declared out-of-service. The average number of defects per truck was 3.46 (vs. 3.31 in 1977). Most defects were found in the lighting/electrical systems. The largest number of out-of-service defects involved service brake systems. The remaining 6% of the inspected vehicles were passenger carriers (buses, authorized or exempt). The average number of defects per bus was 0.83 (vs. 1.08 in 1977). A total of 24,481 driver violations were found among the property and passenger carriers; 52% related to hours of service of drivers (mainly failure to maintain a daily log). In 1978, 1597 accidents were reported to BMCS as having been the result of a mechanical problem. These accidents resulted 124 fatalities, 1305 injuries, and $19,983,560 in property damage. The five most common defects which caused these accidents (brakes, tires, steering, wheels, and coupling devices) accounted for 31% of roadside inspection defects and resulted in 70% of out-of-service actions.

Federal Hwy. Administration, Bureau of Motor Carrier Safety, Washington, D.C. 20590
1980 ; 19p
Availability: Corporate author

HS-028 522

THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS

Size, performance, pollution level, collision damage, and energy conversion efficiency specifications for an inter-urban car of the future are outlined, and their design consequences noted. The requirements suggest an electric car with drive motors mounted on the wheels. The "conformable wheel" is proposed as a means to provide traction through the wheels. The geometry and action are described for the two-dimensional conformable wheel which consists essentially of three separate elements: a central hub capable of revolving freely about a fixed axle, a flexible outer rim or tire which is materially nonelastic and of constant length, and a number of spring-loaded telescopic spokes under compression or tension each capable of being varied in length and each hinged at one end to the hub and at the other end to the tire, with both hinge pins parallel to the axle to permit a limited degree of freedom in the wheel plane. The conformable wheel is designed to achieve traction and steering by changing the shape of the periphery. Its advantages include: no need for complicated mechanical drive joints and only little spring suspension (high degree of vehicle maneuverability), small unsprung mass, large radial movement (soft ride without the need for pneumatic tires and associated wear), simple connections between vehicle body and wheel, larger contact area between tire and ground, and very good transmission efficiency from energy source to driven wheel.

by Sydney Jones
Publ: Electric Vehicle Developments n4 p14-5, 18 (Nov 1979)
1979 ; 2refs
Availability: See publication

HS-028 523

QUICK AND DIRTY VEHICLE ROUTING PROCEDURE

A vehicle routing procedure is presented for use in fleet operations where several customers are served on each route. The procedure has the following steps: estimate the number of schedules required per day (using the author's designated equation); estimate the number of vehicles needed (again, using the equation); identify any geographical barriers which may force a boundary between routes; beginning with one of the identified (or artificially created) boundaries, create a route as much like a teardrop as possible, given customer distribution and problem constraints; and immediately adjacent to this route, create another, repeating the procedure until all customers are served. Construction of routes which comply with these general rules will result in near-optimum vehicle routing operations.

by C. Loren Doll
Publ: Interfaces v10 n1 p84-5 (Feb 1980)
1980 ; 4refs
Availability: See publication

HS-028 524

TRAVEL BEHAVIOR AND THE TOTAL ACTIVITY PATTERN

Conventional aggregate and disaggregate travel models are described, and the problems associated with studying travel behavior in isolation rather than as part of the total activity pattern are noted. Travel behavior research is described which was based on an analysis of "activity diaries" filled in every quarter hour for a week for a sample of about 1100 Dutch citizens. It was found that the reported travel time averaged about 27 quarter hours per week, and the reported travel frequency about 17 trips per week (higher than that reported in other surveys). The number of reconstructed trips (unrecorded in the diaries) was about 17 trips per week. Car ownership and availability had a rather limited influence on number of trips and time spent in traveling. Trip rates were approximately the same for all degrees of urbanization. The travel pattern and activity pattern were studied separately for five categories of the sample population: working men, working women, housewives, students/school children, and others (retired people, unemployed people, etc.). Five broad activity groups were distinguished: work; housekeeping, child care, personal care, meals; shopping; study; and participation in community and cultural life, visiting, and active recreation. Substantial differences were found in activity pattern and travel behavior among the population groups. The use of the total activity pattern and time budgets per activity group as a basis for explaining individual travel behavior is indicated.

by Toon Van Der Hoorn
Publ: Transportation v8 n4 p309-28 (Dec 1979)
1979 ; 19refs
Sponsored in part by Proj. Bureau Integral Traffic and Transportation Studies (Netherlands).
Availability: See publication

HS-028 525

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL

In several attitudinal investigations of individual travel behavior, the reliability of the transportation system was judged to be its most important characteristic. Preliminary research is described for gaining improved understanding of the characteristics of reliability of transportation modes in urban travel. Reliability characteristics are identified; their relative importance is assessed; and an insight into possible structure of an objective reliability index is discussed. This investigation was based on perceived values of reliability, which were identified through a large attitudinal survey conducted in the Chicago metropolitan area. It was concluded that reliability of out-of-vehicle activities is more important to individuals than in-vehicle reliability. This implies that transit operators should be more concerned with arriving at the origin of a trip on time than with arriving at the destination on schedule. Finding a parking place on time is also more important than in-vehicle reliability to car users, who are more irritated with the lack of reliability of waiting time than transit users.

by Joseph N. Prashker
Publ: Transportation v8 n4 p329-46 (Dec 1979)
979 ; 10refs
Availability: See publication

HS-028 526

HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM

he methods used by the British Dept. of the Environment DOE) in 1976 are examined for allocating the public costs ssociated with road provision in Great Britain among the vehi-e categories. Supplementary calculations were also carried out n more recent Dept. of Transport (DOT) estimates. It is sug-ested that the basic apportionment procedures adopted by DOE and employed in subsequent DOT policy documents tend to be sensitive to the assumptions made. These procedures appear to allocate an excessively large share of road usage costs to heavy goods vehicles (commercial trucks). Modifications to the official calculations, using alternative but at least equally sensible assumptions, suggest that the trucks are responsible for considerably less of the annual expenditure on road construction and maintenance than that determined by using the DOE (or revised DOT) formula. The high estimates of truck track costs do not automatically offer a case for lower taxation. Other types of costs, notably environmental and fuel oil foreign exchange, must be taken into account. Road taxes may also be treated as "pure taxes", levied as contributions to general government funds.

by K. J. Button
Publ: Transportation v8 n4 p389-408 (Dec 1979)
1979 ; 27refs
Availability: See publication

HS-028 527

EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT

Results are presented from the first of three-phases in the research and development of an ignition/combustion assist system utilizing the principles of electromagnetics and plasma physics. The work performed included Langmuir probe studies (analysis and limitations of probes; probe measurements of propane and ethylene flames), combustion chamber studies (shape factor analysis; measurements on shapes and chokes), bomb experiment (measurement of interaction of microwave field with propagating flame front plasma), and ignition studies (analysis of conventional spark; plasma jet igniter). It was demonstrated that microwave-flame interaction is a reasonably practical and potentially attractive method of stimulating combustion to decrease vehicular exhaust pollutants and increase engine efficiency.

by Michael A. V. Ward
Combustion Electromagnetics, Inc., 20 Marrett Rd., Lexington, Mass. 02173
DOE-ET-78-C-03-1865
Rept. No. DOE-SAN-1865-T1 ; 1979 ; 100p 4refs
Rept. for 1 Mar 1978-31 May 1979. Included is a preprint of the author's technical paper, "Interaction of Propane-Air Laminar Flame Plasmas with the Microwave TM010 Mode Excited in a Cylindrical Combustion Bomb Cavity," submitted to Journal of Microwave Power (Sep 1979).
Availability: NTIS

HS-028 528

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978

The first annual report describes progress in a 33-month cooperative program between Argonne National Lab. and Gould Inc.'s Nickel-Zinc/Electric Vehicle Proj. designed to demonstrate the technical and economic feasibility of the nickel-zinc battery (Ni-Zn) for electric vehicle (EV) propulsion. The six major tasks of the program are all underway: separator development, zinc electrode development, product design and analysis, cell/module/battery testing, process development, and pilot plant mobilization. All milestones have been met. The performance of the four-cell battery module has been significant. The battery was subjected to 145 deep discharge cycles before dropping below 70% of theoretical capacity. The theoretical capacity is based on the actual amount of active nickel hydroxide, rather than on a percentage of the rated capacity. It is emphasized that since the battery was fabricated in the pilot plant and does not contain "one-of-a-kind" components, it represents production state of the art for Gould's Ni-Zn EV battery technology. Over the last several months, thermal management has been recognized as an important factor affecting Ni-Zn system performance, and work in this area is being accelerated.

Gould Inc., Rolling Meadows, Ill.
ANL-31-109-38-4200
Rept. No. ANL/OEPM-78-11 ; 1979 ; 143p
Progress rept. for 9 Jan-31 Jul 1978.
Availability: NTIS

HS-028 529

FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT

Results are summarized from analyses and design studies to evaluate the sodium-sulfur (NaS) battery, in an existing conventional production automobile, as a potential electric vehicle power source. Major sub-tasks include vehicle specifications, NaS battery packaging study, vehicle packaging layout and electrical system study. The following supporting system studies are appended: performance and economy projections; vehicle handling and safety reviews; and thermal management studies. The Ford Fiesta was chosen as the production vehicle to be modified into a two-passenger, electric test-bed vehicle powered by a NaS battery. The vehicle mission was defined to be a two-passenger, urban/suburban commuter vehicle capable of at least 100-mi range over the constant volume sampler driving cycle and a wide open throttle capability of 0 to 50 mph in 14 sec or less. Powertrain component specifications were defined, and powertrain control strategy selected. A suitable test-bed vehicle package scheme has been developed.

Ford Motor Co., Dearborn, Mich. 48121
DOE-EY-76-C-02-2566-Mod-A005
Rept. No. DOE/CS/2566-1 ; 1979 ; 195p 42refs
Availability: NTIS

HS-028 530

MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC

The problem of two-wheeled motor vehicle (TWMV) accidents is discussed from the perspective of recent accident statistics for Great Britain. Accident casualties among TWMV riders have increased in contrast to a downward trend in most other road user groups. Since 1972 motorcycle rider casualties have almost doubled and moped accidents almost tripled, but a continuing steady decline in accidents has been noted for scooter riders. The 16- and 17-year-olds, mostly males, have become more heavily represented in these casualties. The exuberance and bravado of youth and a failure to appreciate hazards are cited as factors behind many of these TWMV accidents. The vast majority of such accidents in Britain occur in urban areas at intersections, involve at least one other vehicle, and occur on a dry surface. Statistics on accident circumstances are provided from a detailed survey of 425 TWMV accidents in Berkshire and Buckinghamshire during 1974. Lack of information in some other areas is recognized on psychological/sociological factors contributing to motorcycle accidents and on the role of alcohol in TWMV accidents. Various studies pertaining to the location and severity of injuries sustained in motorcycle accidents are reviewed. The recent downward trend in head injuries due to the use of crash helmets in Britain is mentioned. Various studies, particularly British, are reviewed pertaining to the medical, social, and economic consequences of motorcycle accidents. Engineering, enforcement, and education countermeasures are discussed and pertinent literature is cited.

by J. G. Avery
Publ: Practitioner v222 n1329 p369-80 (Mar 1979)
1979 ; 30refs
At the head of title: Special Report, Adolescence.
Availability: See publication

HS-028 531

BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES

Eastern European automobile, truck and bus manufacturers plan to boost their vehicle production 36% from 1978 to 1985, from 3.3 million units to 4.5 million, according to sources inside and outside the Iron Curtain. Total output in these countries is now about one-fourth of the U.S. production. Car output will rise 39% and truck production by 30%. Car registrations are expected to increase from 2.3 million in 1978 to 3.2 million in 1985, and truck registrations from one million in 1979 to 1.3 million. These figures refer to members of the Russian-controlled Council for Mutual Economic Assistance (Russia, East Germany, Poland, Czechoslovakia, Hungary, and Romania) as well as Yugoslavia. Opportunities for East-West trade will be limited by the Leninist-Marxist philosophy which dictates self-sufficiency whenever possible, a shortage of funds and especially hard currency in Eastern Europe, and the slowly declining supply of crude oil in the Soviet Bloc. Despite these obstacles, there appears to be a strong desire among many Western companies and Eastern governments to substantially expand their automotive trade. Ford Motor Co. and General Motors Corp. have established trading companies to set up barter arrangements in these Eastern European countries, confident of much greater trade in the near future. Fiat has built and equipped "turn-key" auto plants in Russia and Poland, and partially owns a Yugoslavian auto plant. U.S. automakers have declined to establish similar turn-key operations in Eastern Europe, for fear that such competitors might one day flood Free World markers with small, inexpensive cars. To support increasing Western sales, the Eastern nations are expanding their dealer organizations to provide sales, service, and parts.

by Joseph M. Callahan
Publ: Automotive Industries v160 n2 p91-5 (Feb 1980)
1980
Includes "If It's Tuesday, This Must Be Szekszard," by the same author.
Availability: See publication

HS-028 532

SNOWMOBILE BASICS

Basic safety and driving tips are provided for the snowmobile operator. "Wind chill," the temperature effect of wind speed, is discussed, together with the proper clothing for snowmobiling, such as warm boots, helmet, tinted goggles, and insulated mitts. A wind chill chart is included. The snowmobile controls and engine are briefly described. Basic driving and handling information is provided. The three positions for the snowmobile driver are noted (seated, standing, kneeling). Some techniques for the snowmobiler are comparable to those used by the dogsledder: hopping off and working the throttle if the vehicle gets bogged down in deep or loosely-packed snow, and occasionally turning the vehicle on its side to unclog the track. Excessive speed, jumping over obstacles, and use of alcohol are discouraged. Preparations for an easy, safe ride are indicated (e.g. checking the condition of the drive belt, making sure track is clear, testing the controls, and checking the fuel), as well as safety items and spare parts to carry (spare drive belt, repair links for drive chain, pliers, flashlight, flares, first-aid kit). Carrying snowshoes is recommended in case of snowmobile breakdown.

Publ: Driver v13 n8 p0-1, 3-8 (Jan 1980)
1980
Availability: See publication

HS-028 533

VACUUM GAUGE: A TOP-NOTCH TROUBLESHOOTER

The vacuum gauge is a ten dollar instrument that can aid the backyard auto mechanic in diagnosing more than 30 different engine problems. Since specific engine problems affect manifold vacuum in certain ways, a vacuum gauge can accurately diagnose the engine's condition by measuring the amount and condition of engine vacuum. Sticking valves, poor rings, bad carburetor adjustments, and a leaky head gasket can be diagnosed and the positive crankcase ventilation valve system can be checked. The gauge can also be used to evaluate fuel economy. A high vacuum reading indicates a narrow throttle plate opening, and therefore increased fuel economy. Accurate, reliable readings can be obtained only from primary manifold vacuum sources; gauge manufacturer's recommendations should be followed for best results. A cranking test of the engine provides diagnostic information in terms of inches of mercury. The healthy emission-controlled engine will give a steady reading of 4 units or more; pre-1968 engines will measure 10 units or more. As the engine is running, the reading should be between 17 and 22 units, although some newer 4- and 6-cylinder models deliver acceptable performance at 15 in. An engine that gives a steady vacuum reading at idle, with the needle dropping toward zero and jumping back past 20 when the throttle is opened and closed quickly, is in good condition. Anything else indicates trouble. A permanent, dash-mounted vacuum gauge is recommended as the best way to monitor engine performance. A separate section provides a "tack up" list of safety precautions for the backyard mechanic.

Publ: Driver v13 n8 p22-6 (Jan 1980)
1980
At head of title: The Backyard Mechanic.
Availability: See publication

HS-028 534

LABORATORY STUDIES OF LANE OCCUPANCY SIGNS

In an evaluation of lane occupancy (lane control) signs, experimental subjects viewed and interpreted slides of conventional and novel signs. The effectiveness of each sign was determined by the speed and accuracy of the subjects' responses. The advantages of changeable message signs over fixed schedule lane occupancy signs were demonstrated by more accurate responses, quicker interpretation, and higher subject preference. The Series 3 red X and green arrows approved by the Manual on Uniform Traffic Control Devices, and the Series 4 Texas A&M design were judged more effective than the Series 2 printed message signs. The Texas A&M sign format has the additional advantage of being able to show incident messages such as "right lane closed," "closed accident," and "must turn right," in addition to the "open" and "closed" lane occupancy messages tested in this study. To reduce installation costs, it would be advantageous to display occupancy information in the highway shoulder-mounted position. It is recommended that the effectiveness of fixed schedule lane occupancy signs be examined further in field studies.

by Donald A. Gordon
Federal Hwy. Administration, Traffic Systems Div., Washington, D.C. 20590
Publ: Public Roads v43 n3 p114-9 (Dec 1979)
1979 ; 4refs
Based on "Regulatory Signs for Lane Occupancy and Parking," by the author (FHWA-RD-78-89).
Availability: See publication

HS-028 535

IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)

Research is reviewed concerning the effect of delineation on driving effectiveness and safety. Delineation is defined as a device or road treatment, excluding signs, that provides guidance and regulatory or warning information to a driver, including painted centerlines, raised pavement markers, postmounted delineators, guardrails, rumble strips, or fencelines. Based on the findings of research studies begun in early 1975 by the Federal Hwy. Administration, it is concluded the centerline delineation is highly cost beneficial and should be used on any paved roadway that carries two or more lanes of traffic. Delineation of the outside edge of the travel lane is also highly desirable, especially for roads wider than 6 m (20 ft). Post-mounted delineators are somewhat more effective for this application than edgelines, but both treatments are useful for roadways with high average daily traffic volumes. Delineation provides important guidance information to motorists when visibility is decreased. There is little difference in effectiveness among delineation treatments and materials, provided that they possess adequate contrast and continuity to impart a clear message to the driver. Supplemental delineation treatments to improve traffic flow for nonstandard, high-hazard situations generally result in great safety benefits. In general, wider application of conventional delineation treatments is desirable and will significantly reduce accidents.

by Richard N. Schwab; Donald G. Capelle
Federal Hwy. Administration; Environmental Div., Washington, D.C. 20590; Alan M. Voorhees and Associates, Operations Div.
Publ: Public Roads v43 n3 p89-96 (Dec 1979)
1979 ; 12refs
Availability: See publication

HS-028 536

ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES

The current status of automotive Stirling engine technology is assessed; the engine is described and the history of its evolution is outlined. Overall engine, component, subsystem, and material problem areas are identified. Recommendations are made for further development and testing, and potential improvements are identified. Projected Stirling engine/vehicle performance is compared to that of current internal combustion engine vehicles in terms of performance, fuel consumption, multifuel capability, emissions, and noise level. Although the automotive Stirling engine is a fledgling compared to the mature internal combustion engine, it is concluded that the potential exists for achieving 1984 Stirling engine development goals. The objectives require at least a 30% reduction in fuel consumption, acceptable emissions, and satisfactory operation with a variety of alternate fuels.

by J. Perry Fraser, ed.; Merton Allen, ed; Therese Derikart, ed.
Mechanical Technology Inc., Stirling Engine Systems Div., 968 Albany-Shaker Rd., Latham, N.Y. 12110
NASA-DEH-3-32; EC-77-A-31-10040
Rept. No. DOE/NASA/0032-79/4; NASA-CR-159631; MTI-79ASE77RE2 ; 1979 ; 336p 107refs
Availability: NTIS

HS-028 537

AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS

Handling characteristics of hypothetical electric vehicle (EV) configurations were studied by applying available analytical methods. Elementary linearized models were used as well as a highly sophisticated vehicle dynamics computer simulation technique. Physical properties of specific EV's were defined for various battery and powertrain packaging approaches applied to a subcompact base car. The group of configurations gave a wide range of weight distribution and inertial properties which characterize a generic class of EV's. Computer simulations of structured maneuvers were performed for predicting handling qualities in the normal driving range and during various extreme conditions related to accident avoidance. Results consistently indicate that an EV with forward weight bias will possess handling qualities superior to one that is rear-heavy or equally balanced; the handling differences become more pronounced as yaw moment of inertia is increased. Rear-heavy EV's were found to be particularly susceptible to excessive sideslip, long response times and undesirable phase lags. Results also demonstrate the importance of properly matching tires, suspension systems, and brake system front/rear torque proportioning to a given EV configuration during the design stage. The methodology employed in this study can provide valuable guidance for developing electric (and other) vehicles with satisfactory handling qualities.

by J. E. Greene; D. J. Segal
Jet Propulsion Lab., Pasadena, Calif.; MGA Res. Corp.
DOE-JPL-955312
Rept. No. DOE/JPL/955312-T1 ; 1979 ; 224p 15refs
Availability: NTIS

HS-028 538

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT

In Phase 1 of a three-phase study, hierarchical schemes of TSM (transportation systems management) strategies and tactics and comprehensive goals were developed. Measures of effectiveness (MOE's) were identified for determining degree of goal attainment through implementation of a given tactic. Data sources, field measurement procedures, and modeling techniques were identified for measuring or estimating each MOE. In Phase 2, four case studies were conducted to test and illustrate the methodology and to demonstrate the effectiveness of a variety of TSM strategies. In Phase 3, sampling and data collection procedures for some commonly used MOE's were developed. Manual and computer modeling procedures for modal split and network analysis were studied, and recommendations were developed on their applicability to TSM analyses. Study results are summarized as a guide for practicing engineers and planners who are engaged in the development and evaluation of urban area TSM plans, by providing a consistent framework for TSM strategy development, recommending measures of effectiveness for TSM strategy evaluation, and identifying and demonstrating manual and computer techniques for TSM analysis.

by Charles M. Abrams; John F. DiRenzo
JHK and Associates, 4660 Kenmore Ave., Alexandria, Va. 22304; Peat, Marwick, Mitchell and Co., 1990 K St., N.W., Washington, D.C. 20006
DOT-FH-11-9246
Rept. No. FHWA-RD-79-113; PB80-198682 ; 1979 ; 195p 44refs
Rept. for Mar 1977-Sep 1979.
Availability: NTIS

HS-028 539

PARATRANSIT RESOURCE GUIDE

A guide is provided to sources of information (including personal contacts) on paratransit development at the Federal, state, and local levels, with emphasis on Federal sources and national information sources. Included are definitions of paratransit, pertinent Federal policies, and annotated introductory overview literature. Other information sources are included, such as the Transportation Res. Information Services Network and National Technical Information Service, Federal legislation, Federal agencies with contact personnel, Urban Mass Transportation Administration and Federal Hwy. Administration offices, professional organizations, consulting firms and research organizations, foreign sources of information, and a paratransit educator resource list. This guide is one element of a set of curriculum materials for university and short course instruction in paratransit. The other materials consist of five case study documents developed around a common but comprehensive analysis framework, and guides to selected readings and curriculum development.

by Allen R. Cook
University of Oklahoma, School of Civil Engineering and Environmental Science, 202 West Boyd St., Room 334, Norman, Okla. 73019
UMTA-OK-11-0001
Rept. No. DOT-I-79-22; PB80-103 237 ; 1979 ; 116p refs
Technology Sharing Prog.
Availability: NTIS

HS-028 540

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979

At approximately 6:25 AM on 22 Aug 1979, a westbound tractor-semitrailer sideswiped an eastbound tractor-semitrailer an then struck an eastbound motorhome on a two-lane, undivide roadway in a construction zone on Interstate 80, about 30 mil northwest of Laramie, Wyo. The driver and co-driver of th westbound tractor-semitrailer were killed. Six of the seven motorhome occupants were ejected and killed; the other occupan was partially ejected and seriously injured. The two persons i the eastbound tractor-semitrailer were not injured. It was dete mined that the probable cause of the accident was the failure of the fatigued driver of the westbound truck to maintain his vehicle within the proper traffic lane. Contributing to the severity of the accident was the excessive speed of the westbound truck as it struck the eastbound truck and the motorhome at speeds of 68 and 58 mph, respectively.

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
Rept. No. NTSB-HAR-80-1 ; 1980 ; 32p 3refs
Availability: NTIS

HS-028 541

NATIONAL TRANSPORTATION SAFETY BOARD. ANNUAL REPORT TO CONGRESS, 1979

Following an overview of the activities of the National Transportation Safety Board (NTSB), the accomplishments of this agency in 1979 are discussed in separate chapters on aviation, rail, highway, marine, pipeline, and hazardous materials safety. In 1979, the NTSB completed 62 major accident investigations. Field investigations numbered 1540. The Board also completed 29 foreign investigations and reviewed 3404 accident investigations conducted by other agencies. 378 safety recommendations, 8 special studies and evaluations, and 1866 statistical reports were also issued. Appended are statistical tables on accidents, accident rates, and fatalities for the various categories of air carrier service (1969 through 1979); and 1979 NTSB statistics: investigations conducted, public hearings held, accident reports adopted, special studies/investigations and safety effectiveness evaluations, and responses to proposed rulemaking.

National Transportation Safety Board, Washington, D.C. 20594
1980 ; 95p refs
Availability: Corporate author

HS-028 542

U.S. DEPARTMENT OF TRANSPORTATION ANNUAL REPORT (NO. 12), FISCAL YEAR 1978

Activities of the Dept. of Transportation (DOT) during fiscal year 1978 are summarized in the areas of transportation policy, reorganization, energy programs, regulatory reform, marine transportation, aviation, highways, railroads, urban mass transportation, and materials transportation. Progress reports are presented for 1978 by the following DOT agencies: Office of the Secretary, Coast Guard, Federal Aviation Administration, Federal Hwy. Administration, Federal Railroad Administration, National Hwy. Traffic Safety Administration, Urban Mass Transportation Administration, Saint Lawrence Seaway Devel. Corp., and Res. and Special Programs Administration. Appended are statistical tables and graphs (1978 and other years to indicate trends) providing data on: DOT budget and personnel, Coast Guard enforcement operations and finances, commercial aviation (personnel, hijacking attempts, accidents and accident rates, fatalities, aircraft hours and miles flown, passengers carried and passenger miles flown), motor carrier safety inspection activity, train accidents and casualties, rail-highway grade crossing accidents and casualties, Alaska railroad revenue freight traffic, Amtrak (passengers, passenger miles, daily train miles, revenues, costs, deficit), motor vehicles (licensed drivers, registered vehicles, vehicle miles traveled, fatalities and fatality rate), and gas and liquid pipeline failures and casualties.

Department of Transportation, Washington, D.C. 20590
1980 ; 71p refs
Availability: GPO, stock no. 050-000-00157-1

HS-028 543

TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS

An extensive survey is provided of in-plane and out-of-plane (camber and castor) tire dynamic performance. The in-plane tire response model incorporates the highly important variation of the effective rolling radius with changing tire deflection. Theoretical and experimental plots are presented for the response to fluctuations in vertical axle position and in tire radius (out-of-roundness). The out-of-plane tire model is based on the well-known taut string model. Tire mass effects have been approximated. Experimental frequency response plots show good correlation with theoretical findings. A simple front wheel suspension system showing three degrees of freedom illustrates the use of the tire model.

by H. B. Pacejka
Publ: International Journal of Vehicle Design v1 n2 p97-119 (1980)
1980 ; 8refs
Presented at the industrial conference on vehicle dynamics, Milton Keynes, England, May 1978.
Availability: See publication

HS-028 544

ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA

An indicator analyzer was developed capable of performing statistical analysis from pressure data from each cylinder of a multi-cylinder engine under steady-state conditions by use of an on-line minicomputer. This analyzer is also able to acquire engine data under transient conditions and to perform interlocutory analyses of any specified combustion cycle, utilizing an off-line large computer. Analysis on the causes of cycle-by-cycle variation of combustion was made, and a simple relationship was derived, revealing that the variance of indicated mean effective pressure may be broken down into three terms such as variances of released heat and change of internal energy and their co-variance. Experiments revealed that the variance of released heat manifests some characteristics related to the fuel supply system. The variance of change of internal energy manifests some characteristics related to the pattern of heat released in the cylinder, but the interpretation of the physical significance of the covariance term remains to be solved. This method is found to be a useful one for analyzing the causes of cycle-by-cycle variation of combustion and its improvement in actual engines.

by H. Nohira; T. Konomi; S. Ishiyama
Publ: International Journal of Vehicle Design v1 n2 p131-42 (1980)
1980
Availability: See publication

HS-028 545

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS

A design tool is presented to predict the cylinder charge pressure and volume necessary to inflate the air bag of a passive restraint system to a given final volume and pressure. The following cases can be solved: charging pressure for a given chamber volume and desired (or specified) final pressure and volume of the bag; final bag volume and pressure for a given chamber volume and charging pressure; and design data for chamber volume, subject to bag specifications and available charging pressures. It is shown that the calculated results are independent of the elastic properties of the air bag and inflation dynamics, and that an equilibrium analysis leads to incorrect predictions.

by M. A. Townsend; D. B. Cherchas
Publ: International Journal of Vehicle Design v1 n2 p143-50
(1980)
1980 ; 5refs
Sponsored by Ontario Transportation Devel. Corp., Ltd.
Availability: See publication

HS-028 546

DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE

A new four-speed automatic transmission with overdrive, the A40D was developed and put into production by Toyota in the 1977 Crown (domestic) and the 1978 Cressida (a model exported to the U.S.). The transmission has excellent reliability and durability, small size, and low weight and cost. Clutch-to-clutch shifting between second and third gears has been improved by utilizing the direct one-way clutch in the overdrive unit. Tests and evaluation criteria of the overdrive unit and clutch-to-clutch shift have been established. Remarkable improvements in fuel economy and noise reduction have been achieved due to the numerically low overdrive gear ratio and optimum shift points.

by A. Numazawa; S. Kubo; Y. Shindo; S. Moroto
Publ: International Journal of Vehicle Design v1 n2 p151-64
(1980)
1980 ; 2refs
Availability: See publication

HS-028 547

VEHICLE STRUCTURAL ANALYSIS: A SURVEY

Attention is drawn to the increased importance of structural analysis in automotive design in the past 20 years. Structural design has advanced from the stage at which new designs were based on experience to the present stage at which detailed computer analyses have become a design tool for most new passenger car bodies. Static and dynamic analysis of integral sheet metal car bodies is discussed, as is the rapidly growing ability of structural analysis to deal with the problem of large deformations on impact. The importance of a thorough understanding of the theory of thin-walled beams in the design of ladder frames for commercial vehicles is underlined. Selected references illustrate the extent of research in vehicle structural analysis.

by G. H. Tidbury
Publ: International Journal of Vehicle Design v1 n2 p165-72
(1980)
1980 ; 42refs
Availability: See publication

HS-028 548

THE INTERPRETATION OF COLLISION SCRATC MARKS

Equations are presented for quantifying collision conditi
from the scratch marks left on one vehicle by a rotating proj
tion, such as a wheel nut (or bolt) from another vehicle durin
sideswipe accident. When the rim and the tire diameters of
scratching vehicle are known, the dimensions of the scra
mark are sufficient to determine the relative velocity of the t
vehicles. If the velocity of one of the vehicles is known,
duration of the contact between the two vehicles and the vel
ity of the second vehicle can also be determined.

by I. Winkler
Publ: International Journal of Vehicle Design v1 n2 p173-6
(1980)
1980
Availability: See publication

HS-028 549

THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION

Algebraic equations were evolved for evaluating the impac
flywheel-transmissions on automobile performance. These e
tions, derived from automobile power and energy balances
scribe total (laden, or fully loaded) mass and energy econom
a function of payload, range, and drive-cycle acceler
demand. Illustrative calculations were made for electric veh
(EV's) and petroleum-fueled automobiles. For EV's, the ba
peak-power capacity required as a function of the driving
tern peak-power demand was determined and was comp
with published forecasts of future battery characteristics. It
found that none of the batteries would be adequate to p
EV's through normal commuter driving patterns within the
decade, nor through normal freeway driving patterns befor
end of the century. Incorporating flywheel-transmissions w
probably enable modified EV's to follow both driving pat
For petroleum-fueled automobile and EV baseline de
simple equations were derived for allowable flywheel-tran
sion mass-fraction for breakeven total mass and breal
energy economy. The mass-fraction for breakeven total
was less than that for breakeven energy economy in pra
situations. It was less for power-determined cars (i.e. EV
ing more battery mass than needed for range requirement)
flywheel addition increased energy efficiency. It was le
range-determined cars (i.e. petroleum-fueled car carrying
battery mass than needed for power requirement) whe
payload exceeded zero. Thus, it was determined to be
difficult to reduce automobile mass than to improve e
economy by using a flywheel-transmission.

by Robert F. McAlevy, 3rd.
Robert F. McAlevy 3rd. and Associates, 1204 Bloomfield
Hoboken, N.J. 07030
W-7405-ENG-48
Rept. No. UCRL-52758 ; 1979 ; 33p 14refs
Prepared for Lawrence Livermore Lab. under Purchase O
2122409.
Availability: NTIS

HS-028 550

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS

A technology-oriented survey was conducted of several recent and ongoing development and demonstration projects involving liquid hydrogen containers for fuel-system service in highway transportation systems. Following a background review, two aspects of the subject are reported: rough production-lot cost estimates for a nominal 50 gal (189 l) horizontal cylindrical container for vehicle service; and design and operational features of four different liquid hydrogen container types (developed by Beech Aircraft Corp., Boulder, Colo.; Minnesota Valley Engineering, New Prague, Minn.; Musashi Inst. of Tech., Tokyo, Japan; and Inst. of Technical Physics, Stuttgart, Germany), three of which have been used as vehicle fuel tanks. A unique, semiautomatic liquid hydrogen "service station" developed by the German institute is described. The state of technology of vehicle hydrogen containers and associated systems is assessed, including the identification of "pacing items" recommended for future research and development activities.

by William J. D. Escher
Escher Technology Associates, St. Johns, Mich.
DOE-EC-77-X-01-2752
Rept. No. HCP/M2752-01 ; 1979 ; 67p 42refs
Availability: NTIS

HS-028 551

BUT ARE THEY SAFE DRIVERS...? (TRUCKING SAFETY)

The use of Citizens Band (CB) radio by truck drivers is discussed in terms of its negative and positive aspects. Too often CB radios are used for the truck driver's amusement (i.e. conversing with fellow truckers), thus distracting him from his task. Used properly and with courtesy, the CB can be (and often has been) a boon to both truckers and motorists in emergencies. Also discussed are truck drivers' schools. Some are fly-by-night operations with inferior curriculum and/or instruction. Many teach a trainee everthing except how to handle an emergency. Others are very comprehensive and use instructors with extensive trucking experience. Despite intensive training, it is pointed out that a minority of drivers display a callous disregard for other motorist's rights. Far too many gruesome and mindless crashes have been recorded recently which point to truck driver misjudgment.

by John L. Sprunger
Publ: California Highway Patrolman v43 n12 p11, 49 (Feb 1980)
1980
Availability: See publication

HS-028 552

HEAD ON. PAINTED IN SAFETY (MOTORCYCLE VISIBILITY)

Two studies are reported concerning motorcycle conspicuity, specifically the detrimental effects on visibility of small size and dark color. In view of the fact that a motorcyclist cannot change the size of his bike and is unlikely to change its color, it is recommended that fluorescent and reflectorized materials be used to increase visibility. Fluorescent materials absorb short-wavelength, nonvisible, high-energy radiation and convert it into longer wavelengths that are visible to the eye as light and color. Fluorescent strips on clothing and paint on bikes are effective safety measures. The nature of fluorescence determines its prime period of effectiveness: sunrise, sunset, and in overcast weather. At night, because of an absence of high-energy radiation, the fluorescence itself is relatively ineffective, although it is more effective than black or brown. For nighttime riding, reflectorized paint and materials are more effective. Unlike fluorescence, which transforms energy to light, reflectorization makes better use of light that is already present. For reflectorized paint to give adequate visual clues, however, it must outline the motorcycle or rider.

by Allyn Fleming
Publ: Cycle v31 n4 p20, 148 (Apr 1980)
1980 ; 2refs
Availability: See publication

HS-028 553

TROUBLESHOOTING LACK OF ENGINE POWER

Information is provided to assist the car owner in determining the cause(s) of a lack of engine power. The problem of no top-end power is caused by a linkage malfunction characterized by the throttle plates not opening to the limit of their travel. Part-throttle "bog" or a "hole" in the power curve is cited as a probable carburetor problem. Two emission control units affecting engine power are noted: the thermostatic air-cleaner assembly and the exhaust gas recirculation (EGR) system. Servicing or testing some other sources of engine power loss is discussed, including fuel filters, the EGR valve, the thermostatic air cleaner, the positive crankcase ventilation system, the fuel pump, and the electrical system. The major causes of poor engine performance are illustrated: defective vacuum advance, clogged fuel filter, bad points and condenser, poor engine timing, binding linkage, binding choke plate, damaged distributor cap, clogged fuel line, weak fuel pump, bad plugs, fouled EGR valve, and loose vacuum hose. Possible causes and their solutions are outlined in a troubleshooting chart. After making a repair, the car should be road-tested to determine if engine power has fully returned. Continued lack of engine power after repair indicates the need to replace plugs and leads.

by Mort Schultz
Publ: Popular Mechanics v53 n4 p45-8 (Apr 1980)
1980
At head of title: Saturday Mechanic.
Availability: See publication

HS-803 819

CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.

The issue of child restraint usage is discussed, and the National Hwy. Traffic Safety Administration's (NHTSA) position on the issue is presented. In the U.S. in 1978, 670 children under the age of five and 1160 children between the ages of five and 14 died as passengers in automobile accidents. Tens of thousands more were injured. Recent surveys have indicated that approximately 93% of children less than ten years old travel without any restraints. NHTSA encourages the states to enact legislation to require special protection for young children. This legislation should adopt Federal Motor Vehicle Safety Standard 213-80 for child-passenger protective devices, should encourage proper conformance to manufacturers' instructions on proper usage, and should require the use of such devices whenever children ride in motor vehicles. States are encouraged to conduct aggressive public information and education programs to increase the public's awareness of the need to use child restraints. Loan-a-seat distribution programs are recommended (instructions for implementation appended) and suggestions are provided for inclusion in media and educational programs.

National Hwy. Traffic Safety Administration, Traffic Safety
Programs, Washington, D.C. 20590
1980 ; 69p refs
Includes the National Hwy. Traffic Safety Administration's
"EarlyRider Educational Curriculum" (for health professionals)
and "EarlyRider Loan A Seat" materials (including "EarlyRider
Shopping Guide").
Availability: NHTSA

HS-803 824

GENERAL SAFETY BELT USAGE. ISSUE PAPER. REV. ED.

The issue of general safety belt usage is discussed, and the National Hwy. Traffic Safety Administration's (NHTSA) position on the issue is presented. Recent surveys suggest that safety belt usage in the U.S. has dropped from 20% in the mid-1970's to only 14% by the end of 1978. NHTSA believes that the most immediate need is to establish a program in each state to get maximum visibility for the restraint issue. This program should make extensive use of existing organizations such as medical groups, highway safety groups, safety councils, civic groups, educational and health groups, and driver education and improvement organizations. Individual state and local workshops should develop and implement a comprehensive occupant restraint plan, beginning with a coordinated media and educational effort focusing particularly on child/infant restraint. Grassroots organizations should be encouraged and their efforts monitored and coordinated with state efforts. Representation at NHTSA follow-up workshops should be from a wide range of groups. Restraint programs using Section 402 funds should include an evaluation plan.

National Hwy. Traffic Safety Administration, Traffic Safety
Programs, Washington, D.C. 20590
1980 ; 42p refs
Includes the summary of a National Hwy. Traffic Safety
Administration "Task Force Report on Mandatory Safety Belt
Usage Laws" (HS-804 088), and a "Resource Guide" to
occupant restraint usage educational materials, prepared by a
national occupant restraint coordination group.
Availability: NHTSA

HS-804 788

HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE

Results are presented of an investigation of the quality, quantity, and timeliness of data on highway safety available to Federal and state highway safety personnel. Coordination is recommended between the data interests of the National Hwy. Traffic Safety Administration and the Federal Hwy. Administration where feasible. Data requests made at the Federal level should be reviewed by knowledgeable public people, such as those who reviewed the National Accident Sampling System (NASS) project. A group of people knowledgeable in accident data and their collection, representing Federal, state, and public interests, should be assembled to make recommendations on the needs and funding of state and Federal highway safety data systems. Until action is taken to resolve the status of data support for the state and Federal activities, it is recommended that the Federal agen-
cies continue to work with the states to help them develo
needed data systems, and that NASS continue to be implemen
ed as the major source of data. An inventory list of accide
data collection projects is appended.

National Hwy. Safety Advisory Com., Washington, D.C. 2059
1979 ; 29p 2refs
Availability: NTIS

HS-804 789

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TC THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE

Results are presented of an investigation of the unsafe operati
of commercial vehicles, the prevalence of which is mainly
tributable to the actual or perceived low level of enforcement
safety regulations by Federal and state officials. This low le
of enforcement (and corresponding low level of compliance)
due to inadequate resources; inhibitive organizational status;
unnecessarily limited authority of the Bureau of Motor Carr
Safety (BMCS); absence of effective inspection programs
commercial vehicle safety equipment; and ineffective sanctio
It is recommended that the Secretary of Transportation br
BMCS resources into line with its responsibilities; reassess
organizational status of the BMCS; increase BMCS authority
include all carriers "affected by" interstate commerce; requ
authority to impose substantial civil penalties for safety regu
tion violations via an administrative procedure; and initiat
Federal/state commercial vehicle inspection program in cer
key states.

National Hwy. Safety Advisory Com., Washington, D.C. 205
Rept. No. PB-292 064 ; 1979 ; 39p 5refs
Availability: NTIS

HS-805 173

ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW

Through maps and charts, supplemented by brief texts, an o
view is provided of the alcohol and safety laws of the diffe
states and their effectiveness in addressing the problems of
tecting, apprehending, convicting, and rehabilitating intoxic
drivers. Map 1 indicates the 14 jurisdictions which have ado
some form of preliminary breath test (PBT). Chart 1 exam
those states that authorize PBT's, the penalties provided
refusal to take the test, and the admissability status of the
results. Charts 2,3, 4, and 5 illustrate the various state
proaches to and procedures for implied consent blood alc
concentration (BAC) tests: legal authority, pertinent laws
quiring BAC tests after traffic accidents, scope of police au
ity in conducting urine and breath tests, and defendant's op
in testing procedures. Map 2 depicts the evidentiary use w
may be made of BAC tests in court (illegal per se and pres
tive evidence). Chart 6 reflects fundamentally different
proaches to the evidentiary weight of BAC tests in court. C
7 focuses on the various administrative and judicial proce
available to deal with defendants accused or convicted of
ing under the influence. Chart 8 depicts the legal age
consumption of beer, wine, and distilled spirits.

National Hwy. Traffic Safety Administration, Traffic Safety
Programs, Washington, D.C. 20590
1980 ; 78p refs
Availability: NHTSA

HS-805 213

55 MPH IMPACT PROGRAM EVALUATION. PHASE 1 SUMMARY REPORT

A pilot test was conducted in Connecticut of the procedures, instrumentation, and methods to be employed in an overall demonstration project to assess the relationship between levels of police patrol strength on limited access highways and motorists' compliance with the fifty-five miles per hour speed limit. The speed-measuring equipment, the utility of data collection procedures and forms, and the scheduling of enforcement patrols are described. Summary data are presented on the enforcement activities of baseline and increased patrol level periods. Problems encountered in Phase 1 included managerial and operational problems, as well as those in data acquisition, sensor performance, and conditions unrelated to the program (gasoline shortage, trooper strike). Recommendations are made for conducting Phase 2, the overall demonstration which will involve Connecticut and other localities.

Connecticut State Police Dept., Traffic Div., 294 Colony St.,
Meriden, Conn. 06450
DOT-HS-8-02048
1979 ; 55p
Report for April-July 1979.
Availability: NITS

HS-805 214

SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT

A study was undertaken to interview seven seriously injured traffic victims and their families and to have them describe, in their own words, the long term personal and social consequences (financial, psychological, and family) of serious traffic accidents. There was a great deal of difficulty in contacting suitable informants. Access to medical records would be an important help in future studies. These medical records would provide a more valid assessment of physical trauma and a more reliable means of contacting victims who have moved since the accident. The Abbreviated Injury Scale (AIS) and the Injury Severity Score (ISS) are poor and inadequate indicators of the long term personal and social consequences that result from serious traffic injuries. In fact, the victim with the lowest ISS rating appeared to suffer the most severe consequences from her injury. A fatalistic attitude toward the use of seat belts was noted. Recommendations for future studies include the effects of spinal cord injuries, independent interviews with other family members, and provisions of additional information on the age, sex, and occupation of the accident victim to supplement AIS ratings.

by Donald Callaway; Charles Drucker
NHTSA-P.O.-8-A0516
1979 ; 23p 3refs
Rept. for May 1978-Jan 1979.
Availability: NTIS

HS-805 225

RULES OF THE ROAD RATED

An annual rating of state traffic laws for 1978 is presented to compare these laws with rules of the road contained in the Uniform Vehicle Code (UVC) as of January 1, 1979. Uniform rules are important in highway safety, and substantial improvement in uniformity and termination of archaic or unreasonable laws are needed to improve the safe and efficient use of highways. Based on ratings of the 50 states, the District of Columbia, and Puerto Rico, it is clear that no state traffic code duplicates every rule of the road, although the number of laws differing from the UVC has been steadily decreasing since 1969. Six states (Connecticut, Indiana, Kentucky, Louisiana, South Carolina, and Utah) made substantial progress toward uniform traffic laws in 1978. The most important single improvement in 1979 was Connecticut's adoption of a rule requiring drivers to yield to pedestrians in crosswalks. The UVC rule limiting the use of alternately flashing red lights on school buses to situations where a bus has stopped has not gained universal acceptance. Of the differences between state traffic laws and the UVC, almost 45% involve traffic control devices and right of way. This difference is too high. A summary table of data on state traffic laws and tables for each article in Chapter 11 of the UVC are appended.

by Edward F. Kearney
National Com. on Uniform Traffic Laws and Ordinances, Suite 430, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036
DOT-HS-8-01952
Publ: Traffic Laws Commentary v9 n1 (Jan 1980)
1980 ; 32p refs
Traffic Laws Commentary Series.
Availability: GPO, stock no. 050-003-00379-4

HS-805 226

STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS

Common names, abbreviations, definitions, uses, sources, synonyms, and representations of data elements transmitted and communicated by state and local traffic record systems are provided in a dictionary intended to promote uniformity in the transmission of traffic records. In the areas of motor vehicle registration, driver licensing, highways, accidents, financial responsibility, motor vehicle inspection, commercial vehicle reciprocity, traffic law enforcement, and emergency medical services, the dictionary is designed to facilitate quick location of desired information. Its use does not require maintenance of all data elements or items, and the dictionary does not standardize any data base design, file structure, or internal storage method. With the aid of standard message structures and protocols, data can be rapidly interchanged by jurisdictions to improve operational functions. Provision has been made for annual amendments to the dictionary. A glossary defines some terms used frequently in the State's Model Motorist Data Base Dictionary. A guide to the use of the Data Element Dictionary, references, and an index are included. An appendix notes data elements by technical subcommittee responsibility.

American National Standards Inst.
Rept. No. ANSI-D-20.1-1979 ; 1979 ; 246p 32refs
Sponsored by the American Assoc. of Motor Vehicles Administrators.
Availability: NHTSA

HS-805 249

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT

A study was undertaken to determine the frequency of alcohol involvement in adult (14 years and over) pedestrian fatalities and injuries; to determine if alcohol was over-represented; to identify the causal role of alcohol; and to suggest countermeasures. Pedestrian fatalities were sampled using data from the New Orleans, La., coroner; nonfatal pedestrian victims were sampled based on information supplied by a large New Orleans hospital; and crash and control data were gathered via followup interviews, roadside interviews, and police files. Results showed that 50% of fatal and nonfatal pedestrian victims had been drinking. About 50% of those who had been drinking had blood alcohol concentrations (BAC's) of 0.20% or higher. Victims were compared to three distinct control groups. The most conservative group, with age and sex matched at the accident site, showed that relative risk of an accident increased markedly at a BAC of 0.20% or more. The least conservative group showed that relative risk increased markedly at a BAC of 0.10% or more. Alcohol-involved pedestrians were more often middle-aged males, struck at night and on weekends, who exhibited various social and personal problems. Common accident types were "dart and dash," "pedestrian strikes vehicle," and "not classifiable." It is concluded that pedestrian drinking is a major factor in adult pedestrian-vehicle crashes. Legal, educational, engineering, and rehabilitation countermeasures are discussed. Appendixes contain study instruments, supporting data, and legal opinion concerning the admissibility into evidence of collected blood alcohol data. An addendum by the National Hwy. Traffic Safety Administration states that none of the recommended countermeasures is currently ready for implementation, since none has been field tested or examined for feasibility or cost-effectiveness.

by Richard D. Blomberg; David F. Preusser; Allen Hale; Robert G. Ulmer
Dunlap and Associates, Inc., 1 Parkland Dr., Darien, Conn. 06820
DOT-HS-4-00946
Rept. No. ED79-11 ; 1979 ; 327p 12refs
Rept. for Jun 1974-Oct 1979.
Availability: NTIS

HS-805 255

MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER

Growth in motorcycle use and increased accidents, injuries, and fatalities are the focus of this issue paper. In light of public concern about gasoline shortages and price increases, consumers are turning to motorcycles as an alternative transportation mode. Motorcycles sales increased by 10%-15% and registrations increased about 4% in 1979. Motorcycle fatalities exceeded 4,800 during the year. A 1968 study by the Airborne Instruments Laboratory concluded that motorcycle operator testing and licensing offered the best long-range and cost-effective accident countermeasure. A 1973 research effort by the Motorcycle Safety Foundation defined knowledge and skills needed by motorcyclists to drive safely. During 1975, the National Hwy. Traffic Safety Administration (NHTSA) funded research in the development of a model motorcycle operators' manual, knowledge tests, and an off-street skills test. These were used in California's Improved Motorcyclist Licensing and Testing Project. The motorcycle off-street skills test (MOST) consists of nine subtests: starting and accelerating on a hill; making sharp turns; turning control (right and left at normal speed); stopping judgment; turning speed judgment; making a quick stop (straight and on a curve); and obstacle avoidance. The motorcycle operators' manual provides applicants with information on basic preriding cycle inspection, rider protective gear, dealing with dangerous road surfaces, and handling on-street emergency situations. The motorcycle in-traffic test of license applicant ability uses uniform forced-choice scoring criteria. Technical, training, and support assistance is available to states desiring to implement motorcycle operator licensing programs from the NHTSA and the Motorcycle Safety Foundation. Improved testing
licensing of motorcycle operators is an essential element of
comprehensive state motorcycle safety program.

National Hwy. Traffic Safety Administration
1980 ; 5p
Availability: NHTSA

HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUM 1. FINAL REPORT

Planning and implementation details are presented of the Ch
Restraint Workshop series which were conducted in each of
10 National Hwy. Traffic Safety Administration (NHTSA)
gions. These workshops were designed to improve the effecti
ness of grass roots organizations in the conduct of ongoing ch
restraint programs, to initiate coordination efforts within sta
and to encourage grass roots support for increasing the numb
of organizations actively involved in the child passenger saf
area. During each two-day workshop, representatives from se
ice organizations, health care professions, state legislatures, a
law enforcement personnel, along with highway safety offici
were provided with facts about the extent of the problem a
its solution. Programs that promote child restraint use (legis
tive, education, and information dissemination) were discuss
Workshop planning details focus on the selection of dates a
locations, the identification of participants, the determination
program format and content, and the preparation of worksh
materials. Implementation details encompass an extensive outli
of workshop topics, and highlights and trends of each particul
workshop. It was recommended that NHTSA continue to
nance and support future programs.

by Beverly T. Orr; Linda P. Desper; Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center, South
Campus, CTP 197A, Chapel Hill, N.C. 27514
DOT-HS-8-02057
1979 ; 205p 9refs
Rept. for 29 Sep 1978-30 Sep 1979. Vol. 2 is HS-805 267.
Availability: NTIS

HS-805 267

CHILD RESTRAINT WORKSHOP SERIES. VOLUM 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT

Ongoing and planned child restraint programs in the 10 Natio
al Hwy. Traffic Safety Administration regions are describe
Program information is based on workshop interaction, follo
up of workshop participants, and other sources. The worksh
series was held in the 10 regions to improve the effectiveness
grass roots organizations in ongoing child restraint programs,
initiate coordination efforts within states, and to encourage gra
roots support in increasing the number of organizations active
involved in the child passenger safety area. Educational pr
gram descriptions include information on sponsoring agenc
beginning date, funding agency, target group(s), method of ed
cation, educational-instructional materials used, and conta
person. Child safety seat distribution program descriptions co
tain data on sponsoring agency, beginning date, funding sourc
people involved, working facility, number and source of init
seats, type(s) of seats, method of locating parents, rental fe
deposit, and contact person. Guides for followup contact wi
workshop participants are appended.

by Beverly T. Orr; Linda P. Desper; Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center, South Campus, CTP 197A, Chapel Hill, N.C. 27514
DOT-HS-8-02057
1979 ; 153p 6refs
Rept. for 29 Sep 1978-30 Sep 1979. Vol. 1 is HS-805 266.
Availability: NTIS

HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT

by Lonney S. Pauls
ASL Engineering, Inc., 2936 De La Vina, Santa Barbara, Calif. 93101
DOT-HS-7-01664
1980 ; 48p
Rept. for 3 Aug 1977-30 Jun 1979. For abstract, see Vol. 2, HS-805 271; Vol. 3, Appendices, is HS-805 272.
Availability: NTIS

HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT

The problem of identifying and selecting superior energy-absorbing materials for school bus interiors was addressed in a study program designed to develop material selection criteria, to identify and select superior energy-absorbing materials currently on or nearing the market, and to verify material selections using established criteria. Material selection pass/fail criteria were developed in the areas of flammability, smoke emissions, toxicity, energy absorption, shock attenuation, torso impacts, facial impacts, head impacts, knee impacts, general design, producibility, cost and weight, maintainability and environmental durability, and resistance to vandalism. Screening of candidate padding cover and core materials was performed, based on three factors: high-temperature performance; physical characteristics important from the standpoint of padding design; and material cost. Mild steel alloy and Kydex 100, an acrylic polyvinyl chloride compound, were found to be good to excellent cover materials. Favorable core materials were low-smoke Neoprene and paper honeycomb. A set of preferred materials was tested experimentally to verify their compliance with these criteria. The tests included flammability, dynamic drop, and sled impact tests.

by Lonney S. Pauls
ASL Engineering, Inc., 2936 De La Vina, Santa Barbara, Calif. 93101
DOT-HS-7-01664
1980 ; 208p 29refs
Rept. for 3 Aug 1977-30 Jun 1979. For summary report, see Vol. 1, HS-805 271; Vol. 3, Appendices, is HS-805 272.
Availability: NTIS

HS-805 272

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT

Supplementary information is provided for a report on the identification and selection of superior energy-absorbing materials for school bus interiors. Material selection criteria consider high-temperature performance (ignitability, flame spread, smoke emissions, and toxicity), shock attenuation (compliance with injury criteria), energy absorption, and general design (cost and weight effectiveness and environmental and vandal resistiveness). The information includes a state-of-the-art review of the design of bus interior padding systems; a copy of Federal Motor Vehicle Safety Standard No. 302 test standards for flame spread, ignitability and emissions; and results of flammability, drop, and sled tests.

by Lonney S. Pauls
ASL Engineering, Inc., 2936 De La Vina, Santa Barbara, Calif. 93101
DOT-HS-7-01664
1980 ; 424p refs
Rept. for 3 Aug 1977-30 Jun 1979. For summary report, see Vol. 1, HS-805 270; Vol. 2 is HS-805 271.
Availability: NTIS

HS-805 291

FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS

Fuel economy standards for model year (MY) 1982 light trucks are examined (background, assumptions, microeconomic and macroeconomic analysis, alternatives, and issues). Effects of the final rule for MY 1982 light trucks, in comparison to light trucks meeting MY 1981 standards, are: lifetime fuel savings (128,195 miles), 1.2 billion gallons; average estimated retail price increase, $95 per vehicle; present value of operating cost savings, $470 per vehicle; net consumer benefits, $375 per vehicle; and industry investment requirements, $900 million. This final rule sets average fuel economy standards at 18 mpg for two-wheel drive light trucks and at 16 mph for four-wheel drive trucks. Vehicles subject to the rule include pickup trucks, vans, and general utility vehicles weighing 8,500 pounds gross vehicle weight or less, having a curb weight of 6,000 pounds or less, and having a frontal area of 45 square feet or less. It is projected that except for Chrysler Corp., all manufacturers will be able to meet the standards and have plans to exceed the standards. Appended are technology costs and capital expenditures incurred by manufacturers.

by James F. Simons; Warren G. LaHeist
National Hwy. Traffic Safety Administration, Office of Program and Rulemaking Analysis
1980 ; 86p refs
Availability: NHTSA

HS-805 294

ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980

Provisions of three acts administered by the National Hwy. Traffic Safety Administration are detailed. The Highway Safety Act of 1966 defines the authority of the Secretary of Transportation and contains sections dealing with highway safety programs, highway safety research and development, duties of the National Hwy. Safety Advisory Committee, school bus driver training, and innovative project grants. The motor Vehicle Information and Cost Savings Act focuses on bumper standards, automobile consumer information, diagnostic inspection demonstration projects, odometer requirements and improvement of automotive efficiency (fuel economy). The National Traffic and

Motor Vehicle Safety Act of 1966 is concerned with motor vehicle safety standards (including notification and remedy of defects), tire safety, research and test facilities, and establishment of a national driver register.

Department of Transportation
1980 ; 98p
Availability: Corporate author

HS-805 307

THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET

Two studies dealing with safety belt use in relation to comfort and convenience were designed to determine the rate of safety belt use in the United States and to examine differences among various seat belt systems in 1980 vehicles in terms of comfort, convenience, and ease of use. In the belt use study, observations of more than 150,000 drivers were made at traffic intersections in 19 metropolitan areas during the Nov 1977-Dec 1979 period. Using observations of more than 16,000 cars between July-December 1979, the study also examined passenger car occupancy rates and restraint use by age category. In the comfort and convenience study, 115 participants selected from among licensed drivers in the Detroit metropolitan area were asked to rate seat belts according to accessibility, extending, buckling, fit, pressure, releasing, and retracting. Belt systems in 36 vehicles were also evaluated for compliance with the National Hwy. Traffic Safety Administration requirements for comfort and convenience. Belt use by drivers averaged 14.1%, 13%, and 10.9% for 1977, 1978, and 1979, respectively. Automatic belts were used more than manual belts. Use rates were higher for women than men. Among late model cars, use was highest for subcompact cars, next highest for compact cars, and lowest for intermediate and full-size cars. Use was higher in newer foreign cars than in U.S. models, higher on turnpikes than other roads, and slightly higher during the day than at night. For infants one year old or less, restraint use, both incorrect (23%) and correct (22%), was highest; children aged one to four had the lowest seat belt use. The greatest problem in comfort and convenience was latch plate accessibility, followed by problems in extending the latch plate, belt fit, belt pressure, and buckling. Factors in safety belt use were vehicle size, manufacturer, road type, geographic area, city, sex, income, and safety consciousness (head restraint use). Also noted are safety belt compatibility problems with child restraints.

Department of Transportation, Office of Public and Consumer Affairs, Washington, D.C. 20590
1980 ; 20p
Availability: Corporate author

HS-805 580

THE CAR BOOK: A CONSUMER'S GUIDE TO CAR BUYING

Information is tabulated for 20 subcompact, 16 compact, 25 intermediate, and 20 large cars, both foreign and domestic, on the following main topics: safety, fuel economy, maintenance, and insurance. A purchasing guide rates each vehicle on crash test results; safety belt comfort and convenience; fuel economy; and costs of preventive maintenance, general and accident repair, and insurance. The safety section covers crash test results, fatality rates, child seats, and safety belts. Factors affecting fuel economy are briefly discussed. Comparative maintenance costs are tabulated for 9 components and preventive maintenance, then rated relatively. The tire grading system and t
buying are discussed. Insurance and accident costs, includi
discounts and surcharges are given. Steps to resolve complai
are outlined, and using the hotline explained. Used car buyi
tips are given, and safety recalls in 1977-1980 are tabulated
make and model for 11 automotive systems. Brief discussions
the Research Safety Vehicle, automatic safety belts, and air b
are included. A buyer's checklist is provided, as are names
addresses of Federal agencies having automobile programs
presidents of the major automobile manufacturers.

National Hwy. Traffic Safety Administration, Washington, D
20590
1980 ; 70p 42refs
Availability: Consumer Information Center, Pueblo, Colo. 81

HS-810 367

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORL MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980

Trends in the automotive industry are examined, with refere
to motor vehicle accidents and safety measures. Although
economy seems to have the highest priority, safety is an equ
important market issue. In the U.S., motor vehicle accidents
50,000 people a year, and represent the leading cause of de
and disfiguring injury among young people. The automo
industry has been slow to adopt a "preventive engineer
approach and blames government for many of its difficul
Instead of favoring foreign competition in the U.S., Federal
economy standards are making U.S. companies more com
tive at home and abroad in their products and producti
Under the pressure of these standards, automobile manufactu
are combining advantages of American cars with improved
economy, lower emissions and some increase in safety. C
testing of new vehicles is described. The immediate challeng
manufacturers is fuel economy; by 1985, it is expected tha
million gallons of fuel per day will be saved through mil
improvements. Areas where competitive innovation can be
plied are styling, electronics, design of trouble-free cars,
occupant safety. The market potential of safety is discusse
connection with the Res. Safety Vehicle (RSV) and safety i
vations by automobile manufacturers: foam-filled steel struc
(RSV), air bags, passive belts, three point belts, more c
worthy structures, antilock brakes, computer diagnosis
warning systems, "soft" front bumpers, and run-flat tires.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington,
20590
1980 ; 24p
Availability: NHTSA

HS-810 368

REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980

Technology developments in the motor vehicle industry
related safety legislation are explored. There is increasing r
nition that benefits of technology are not without concom
costs. In 1979, traffic deaths totaled over 50,000, the fifth
ing cause of death in the U.S. The annual cost of motor ve
accidents, including lost productivity, medical bills, and i
ance payments, is reaching $50 billion. The General Accou
Office estimates that motor vehicle safety standards in

through 1974 saved more than 28,000 lives. When this annual rate is projected through 1979, it is estimated that about 64,000 lives were saved. Federal fuel economy standards are significant. Requirements for passenger automobiles through model year 1985 and for light trucks through model year 1981 correspond to a saving of 220 billion gallons of gasoline between 1978 and 1990 (savings of $60 billion in imported fuel costs). Fuel economy and safety goals sometimes conflict, but research indicates that technology is available to reduce more highway deaths and injuries without sacrificing fuel economy. The Motor Vehicle Information and Cost Savings Act has created several programs to help consumers. Among these are consumer information standards on uniform tire quality grading, and vehicle crashworthiness, susceptibility to damage, and cost of repair. Crash tests of new vehicles are described (film). Future requirements of automatic restraint systems are outlined. Cooperation of vehicle fleet operators is solicited.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1980 ; 19p
Availability: NHTSA

HS-810 369

REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980

The use of child restraint devices to reduce deaths and injuries to children traveling in motor vehicles is addressed. Cars are not designed for young children, and they frequently do not accomodate standard child restraint devices. Many improvements are needed, such as elimination of protruding knobs and surfaces from the lower dashboard, the exterior, and elsewhere in the vehicle. Any child safety seat sold in the United States should fit any automobile, and automobile seat belts should be long enough to accomodate any child restraint; tether anchorages or predrilled holes for easy installation should be installed in every car manufactured; inertial reels in the front passenger position should have locking mechanisms for the safe installation of child restraints; and cargo compartments in all vehicles should be made inaccessible to children crawling from the back seat. Since about 90% of parents do not provide proper child restraint devices to compensate for safety shortcomings in automobiles, it is estimated that about 2000 children under 14 years of age will die in automobile accidents during 1980 and that 90,000 will be injured seriously enough to require hospital admission or treatment. Most injuries will be to the head and face. Factors in the use of child restraint devices are examined, and Federal efforts to upgrade child seating systems (crash testing) are reviewed. The need to educate health professionals and consumers about motor vehicle safety is emphasized, and methods to accomplish this are enumerated.

by Joan Claybrook
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1980 ; 14p
Availability: NHTSA

HS-810 370

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980

Testimony was presented regarding proposed amendments to Title V of the Motor Vehicle Information and Cost Savings Act. Title V requires the Secretary of Transportation to set corporate average fuel economy standards for passenger cars and light trucks. Projected cumulative passenger car fuel savings from model year 1978 through model year 2000 will approximate 395 billion gallons. Comparable fuel savings for light trucks are estimated to be about 114 billion gallons. Both government and consumer cost savings due to fuel economy standards are significant. In its evaluation of the standards, the National Hwy. Traffic Safety Administration recommends certain changes: to exempt passenger cars and light truck manufacturers producing fewer than 10,000 vehicles per year; to allow manufacturers to average U.S. assembled automobiles with their imports if U.S. production was initiated before the Act; to allow credits earned by manufacturers to be carried forward or backward for three years instead of the current one year; and to exempt manufacturers from a finding of unlawful conduct for their failure to comply with fuel economy standards if they have earned sufficient credits in the three years before the penalty year to offset such a penalty. Low-volume manufacturers are noted in an appendix.

by Joan Claybrook
National Hwy. Traffic Safety Administration
1980 ; 12p
Availability: NHTSA

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INDEX to ABSTRACTS

blank page

KWOC Title Index

ABDOMINAL
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

ABSORBING
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

ACADEMY
REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

ACCELERATION
MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

ACCREDITED
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

ACTIVITY
TRAVEL BEHAVIOR AND THE TOTAL ACTIVITY PATTERN
HS-028 524

ACTS
ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980
HS-805 294

ACUTE
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

ADDED
SHOT PEENING--AN ADDED DIMENSION
HS-027 509

ADDICTION
TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT
HS-027 416

ADMINISTERED
ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980
HS-805 294

ADMINISTRATORS
REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

ADMITTED
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

ADVISING
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

ADVISORY
COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

AERODYNAMIC
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

AERODYNAMICS
METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

AGE
THE DIFFICULT AGE (SAFETY RESTRAINTS FOR CHILDREN)
HS-027 422

AGGREGATE
AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

AIDS
COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

AIR
AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

WHO NEEDS AIR BAGS?
HS-028 388

AIRBAG

OCCUPANT-VS-AIRBAG FORCES MEASURED
HS-027 504

ALCOHOL

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW
HS-805 173

BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

ROAD ACCIDENTS: ARE DRUGS OTHER THAN ALCOHOL A HAZARD?
HS-027 444

ALCOHOLICS

BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

ALCOHOLISM

TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT
HS-027 416

ALONG

SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

ALTERNATING

A.C. (ALTERNATING CURRENT) MOTOR CONTROL FOR ADVANCED ELECTRIC VEHICLES
HS-028 507

AMENDMENTS

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

AMERICA

MOTOR TRUCKS OF AMERICA. 1ST ED.
HS-028 520

AMERICAN

REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

ANALYTICAL

AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

ANALYZER

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

ANSWER

PASSIVE RESTRAINTS ARE CALLED ANSWER FOR THOSE PEOPLE WHO WON'T BUCKLE UP
HS-027 500

ANTIBLOCKIERSYSTEM

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

ANTISKID

ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

AORTA

SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

APPRAISAL

AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

ARKANSAS

ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT
HS-027 476

ARLINGTON

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

ASSEMBLY

DIAGNOSTICS OF GEAR ASSEMBLY--A NEW APPROACH USING IMPACT ANALYSIS
HS-028 395

ASSESSING

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

ASSESSMENT

ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

ASSOCIATION

REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

ATTITUDES

AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

ATTRIBUTES

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

AUFBAU

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

AUTO

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

AUTOMATED

AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

AUTOMATIC

"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

AUTOMATIC CAR-FOLLOWING--A STUDY OF POSSIBLE CONTROLLERS
HS-027 454

AUTOMATIC LONGITUDINAL CONTROL OF HIGHWAY VEHICLES
HS-027 455

DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

AUTOMOBILE

COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM
HS-027 462

MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

AUTOMOBILES

MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?
HS-027 443

STIRLING ENGINES FOR AUTOMOBILES
HS-028 386

AUTOMOTIVE

ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

AUTOMOTIVE FUELS FOR THE 1980'S
HS-027 519

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

AVI

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

BAGS

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

WHO NEEDS AIR BAGS?
HS-028 388

BASE

MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE

HS-028 515

STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS

HS-805 226

BASICS

SNOWMOBILE BASICS

HS-028 532

BATTERIES

EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA

HS-027 417

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978

HS-028 528

BATTERY

FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT

HS-028 529

BEAMS

"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM

HS-027 490

BEARING

BEARING LIFE EXPENDITURE DURING RUNNING-IN

HS-027 512

BEEN

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS

HS-027 413

BEHAVIOR

LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS

HS-028 393

TRAVEL BEHAVIOR AND THE TOTAL ACTIVITY PATTERN

HS-028 524

BELT

GENERAL SAFETY BELT USAGE. ISSUE PAPER. REV. ED.

HS-803 824

SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA

HS-028 502

THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET

HS-805 307

BELTS

SEAT-BELTS. A STUDY OF THEIR EFFECT ON 3,0
ACCIDENTS

HS-028

BLOOD

BLOOD ALCOHOL LEVEL DISCRIMINATION BY A
COHOLICS: THE ROLE OF INTERNAL AND EXTE
NAL CUES

HS-027

BMEP

DESIGN AND FATIGUE LIFE EVALUATION OF P
TONS FOR HIGH BMEP (BRAKE MEAN EFFECTI
PRESSURE) DIESEL ENGINES

HS-027

BOARD

NATIONAL TRANSPORTATION SAFETY BOAR
ANNUAL REPORT TO CONGRESS, 1979

HS-028

BOOK

THE CAR BOOK: A CONSUMER'S GUIDE TO C
BUYING

HS-805

TRANSIT FACT BOOK. 1978-1979 ED.

HS-028

BRAIN

PERCEPTUAL/COGNITIVE SKILLS AND DRIVIN
EFFECTS OF BRAIN DAMAGE

HS-028

BRAKE

DESIGN AND FATIGUE LIFE EVALUATION OF P
TONS FOR HIGH BMEP (BRAKE MEAN EFFECTI
PRESSURE) DIESEL ENGINES

HS-027

BREED

HIGH QUANTITY, LOW COST, HIGH ENVIRONME
AUTOMOTIVE TRANSDUCERS, A NEW BREED F
USE IN ADVANCED AUTOMOTIVE ELECTRON
SYSTEMS

HS-027

BRITISH

LEGAL BUT LETHAL (BRITISH TIRE LAWS)

HS-027

BRITTLE

POST-PROCESSING GRAPHICS FOR BRITTLE FA
URE ANALYSIS

HS-027

BUCKLE

PASSIVE RESTRAINTS ARE CALLED ANSWER F
THOSE PEOPLE WHO WON'T BUCKLE UP

HS-027

BUMPER

BUMPER IMPACTS STUDIED VIA COMPUTER

HS-027

BUS

IDENTIFICATION OF SUPERIOR ENERGY-ABSOR
ING MATERIALS FOR SCHOOL BUS INTERIO
VOLUME 1. FINAL SUMMARY REPORT

HS-805

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

THE SEATED BUS PASSENGER--A REVIEW
HS-027 470

BUYING

THE CAR BOOK: A CONSUMER'S GUIDE TO CAR BUYING
HS-805 580

CALCULATION

CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

CALCULATIONS

ADVANCED APPROACHES FOR HEAT TRANSFER CALCULATIONS
HS-027 429

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

CALIFORNIA

CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

CALLED

PASSIVE RESTRAINTS ARE CALLED ANSWER FOR THOSE PEOPLE WHO WON'T BUCKLE UP
HS-027 500

CAPACITY

HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM
HS-027 462

CAR

AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

AUTOMATIC CAR-FOLLOWING--A STUDY OF POSSIBLE CONTROLLERS
HS-027 454

ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

THE $200 MILLION CAR
HS-027 418

THE CAR BOOK: A CONSUMER'S GUIDE TO CAR BUYING
HS-805 580

THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS
HS-028 522

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

CARPOOL

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

CARS

CARS AND ROADS: UP-TO-DATE OR OBSOLETE?
HS-027 421

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

THE FUEL-SAVING SHAPE OF CARS TO COME
HS-027 497

CASE

CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

CASES

HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES
HS-027 495

CAST

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

CASUALTIES

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

CAUSES

CAUSES AND PREVENTION OF ROAD ACCIDENTS
HS-027 447

CERVICAL

HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

CFR

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

CHAMBER

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

CHAPTER
REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

CHARACTERISTICS
MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

CHARGING
DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

CHILD
AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.
HS-803 819

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB
HS-027 475

THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

CHILDREN
CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?
HS-027 443

THE DIFFICULT AGE (SAFETY RESTRAINTS FOR CHILDREN)
HS-027 422

CLASSES
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

CLASSIFICATION
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

CLUB
LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB
HS-027 475

COEFFICIENTS
DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

COGNITIVE
PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

COLLISION
HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 54

THE INTERPRETATION OF COLLISION SCRATCH MARKS
HS-028 54

COLOUR
COLOUR VISION DEFICIENCIES IN ROAD TRAFFI
HS-027 44

COMBUSTION
ANALYSIS ON CYCLE-BY-CYCLE VARIATION O COMBUSTION FROM PRESSURE INDICATOR DAT
HS-028 54

EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES FINAL TECHNICAL REPORT
HS-028 52

COMFORT
THE U.S. DEPARTMENT OF TRANSPORTATIO SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET
HS-805 30

COMMERCE
PROPOSED AMENDMENTS TO TITLE V OF TH MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERC MARCH 28, 1980
HS-810 37

PUBLIC AND PRIVATE COORDINATION NEEDE IF AUTO REPAIR PROBLEMS ARE TO BE REDUCE REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND IT CONSUMER SUBCOMMITTEE
HS-028 3

COMMERCIAL
COMMERCIAL VEHICLE MAINTENANCE AN SAFETY INSPECTION PROGRAMS. A REPORT T THE SECRETARY OF TRANSPORTATION BY TH

NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

COMMISSION

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

COMMITTEE

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

COMPARISON

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

COMPLIANCE

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

COMPONENT

COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

COMPONENTS

INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

COMPOUND

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

COMPREHENSIVE

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

COMPUTER

BUMPER IMPACTS STUDIED VIA COMPUTER
HS-027 503

COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

COMPUTERS

COMPUTERS IN ENGINE DESIGN
HS-027 518

CONCEPT

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

CONCEPTS

DIESEL ENGINE DESIGN CONCEPTS FOR THE 1980'S
HS-027 516

CONFERENCE

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

CONFLICT

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

CONGESTION

CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

CONGRESS

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

NATIONAL TRANSPORTATION SAFETY BOARD. ANNUAL REPORT TO CONGRESS, 1979
HS-028 541

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

CONSEQUENCES

SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

CONSERVATION

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

CONSPICUITY

ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 498

CONSTRUCTION

CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

CONSUMERS

CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

CONTAINER

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

CONTROL

A.C. (ALTERNATING CURRENT) MOTOR CONTRO
FOR ADVANCED ELECTRIC VEHICLES
HS-028 50

AUTOMATED CONTROL OF GUIDEWAY TRANSI
VEHICLES
HS-027 45

AUTOMATIC LONGITUDINAL CONTROL OF HIGH
WAY VEHICLES
HS-027 45

ELECTRONIC CONTROL UNIT FOR PASSENGE
CAR ANTISKID
HS-027 45

MANUAL ON UNIFORM TRAFFIC CONTROL DE
VICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 65

MULTIPROCESSOR SYSTEM FOR DEVELOPIN
CONTROL STRATEGIES OF CAR ENGINES
HS-027 46

THE PERFORMANCE OF NTS (NIIGATA NE
TRANSPORTATION SYSTEM) VEHICLE STEERIN
CONTROL SYSTEM. A STUDY
HS-027 45

CONTROLLERS

AUTOMATIC CAR-FOLLOWING--A STUDY OF POS
SIBLE CONTROLLERS
HS-027 45

CONTROLS

THE 80S. STANDARDS FORCE MOVE TO ELEC
TRONIC ENGINE CONTROLS
HS-027 43

CONVENIENCE

THE U.S. DEPARTMENT OF TRANSPORTATIO
SURVEYS ON SAFETY BELT USE AND THEIR COM
FORT AND CONVENIENCE. FACT SHEET
HS-805 30

COOLANT

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOS
TO COOLANT ON THE HIGH OUTPUT DIESE
ENGINE CYCLE
HS-027 42

COORDINATION

PUBLIC AND PRIVATE COORDINATION NEEDE
IF AUTO REPAIR PROBLEMS ARE TO BE REDUCE
REPORT TO THE SENATE COMMITTEE ON COM
MERCE, SCIENCE AND TRANSPORTATION AND IT
CONSUMER SUBCOMMITTEE
HS-028 3

CORD

SPINAL CORD INJURIES AS A RESULT OF MOTO
CYCLE ACCIDENTS
HS-027 4

COST

HIGH QUANTITY, LOW COST, HIGH ENVIRONMEN
AUTOMOTIVE TRANSDUCERS, A NEW BREED FO
USE IN ADVANCED AUTOMOTIVE ELECTRON
SYSTEMS
HS-027 4

PROPOSED AMENDMENTS TO TITLE V OF TH
MOTOR VEHICLE INFORMATION AND COST SA
INGS ACT. STATEMENT BEFORE THE SUBCOMMI
TEE ON ENERGY AND POWER, HOUSE COMMI

TEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

COUNCIL
LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB
HS-027 475

COUPLING
TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

CRACK
FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

CRANIOCERVICAL
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

CRASH
CRASH PROTECTION IN ROAD ACCIDENTS
HS-028 390

CRASHWORTHINESS
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

CUES
BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

CURTAIN
BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES
HS-028 531

CYCLE
ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

CYLINDER
EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

DAMAGE
PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

DANISH
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

DATE
CARS AND ROADS: UP-TO-DATE OR OBSOLETE?
HS-027 421

DEFICIENCIES
COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

DEFINITION
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

DELAY
THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS
HS-027 496

DELAYS
DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

DELINEATION
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

DEMAND
APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

DEMONSTRATION
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

DEPARTMENT
FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET
HS-805 307

U.S. DEPARTMENT OF TRANSPORTATION ANNUAL REPORT (NO. 12), FISCAL YEAR 1978
HS-028 542

DEPARTMENTS
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS IN-

VOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

DEPENDENCE
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

DESIGN
COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

COMPUTERS IN ENGINE DESIGN
HS-027 518

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

DIESEL ENGINE DESIGN CONCEPTS FOR THE 1980'S
HS-027 516

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

ENGINE TECHNOLOGY FOR THE 1980'S. ENGINEERING KNOW-HOW IN ENGINE DESIGN, PT. 27
HS-027 515

SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

SOME DIESEL PISTON FEATURES IN DESIGN ANALYSIS AND EXPERIMENT
HS-027 434

DEVELOPING
MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

DEVICES
ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

DIAGNOSTICS
DIAGNOSTICS OF GEAR ASSEMBLY--A NEW APPROACH USING IMPACT ANALYSIS
HS-028 395

DICTIONARY
STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

DIDN
CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 49

DIESEL
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 43

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 43

DIESEL ENGINE DESIGN CONCEPTS FOR THE 1980'S
HS-027 51

DIESEL ENGINE MANUFACTURING IN THE 1980'S
HS-027 51

DIESEL ENGINE THERMAL LOADING
HS-027 42

DIESEL-STIRLING COMBINATION MAY IMPROVE EFFICIENCY
HS-027 50

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 42

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 42

SOME DIESEL PISTON FEATURES IN DESIGN ANALYSIS AND EXPERIMENT
HS-027 434

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

DIFFICULT
THE DIFFICULT AGE (SAFETY RESTRAINTS FOR CHILDREN)
HS-027 422

DIGITAL
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

DIGITALER
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

DIMENSION
SHOT PEENING--AN ADDED DIMENSION
HS-027 509

DIMENSIONAL
STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

DIMMING
"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

DIRECT
DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

DIRTY
QUICK AND DIRTY VEHICLE ROUTING PROCEDURE
HS-028 523

DISAGGREGATE
AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

DISCRIMINATION
BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

DISSECTION
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

DISTANCE
SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

DISTRIBUTION
DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

DOE
FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

DOT
IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

DRAG
AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

DRINKING
ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

DRIVER
DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

DRIVER EYE HEIGHT: A FIELD STUDY
HS-027 492

DRIVERS
BUT ARE THEY SAFE DRIVERS...? (TRUCKING SAFETY)
HS-028 551

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

DRIVING
ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

DRUG
TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT
HS-027 416

DRUGS
ROAD ACCIDENTS: ARE DRUGS OTHER THAN ALCOHOL A HAZARD?
HS-027 444

DUPLICATION
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

DYNAMICS
AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

ECONOMETRIC
CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

ECONOMY
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY

STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

VEHICLE FUEL ECONOMY REVIEW
HS-027 499

EDUCATION
DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

EFFECTIVE
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

EFFECTIVENESS
MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

EFFICIENCY
DIESEL-STIRLING COMBINATION MAY IMPROVE EFFICIENCY
HS-027 506

EFFICIENT
CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

EFFORTS
CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

EINFLUSS
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

ELECTRIC
A.C. (ALTERNATING CURRENT) MOTOR CONTROL FOR ADVANCED ELECTRIC VEHICLES
HS-028 507

AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

ELECTRICAL
IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

ELECTRONIC
ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

THE TRUCK ELECTRONIC GOVERNOR SYSTEM
HS-027 464

THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS
HS-027 437

ELECTRONICS
IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

ELEKTRONIK
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

ELEMENT
STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

ENERGY

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

ENERGY POLICY IMPACT EVALUATION
HS-028 510

FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

ENFORCEMENT

ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

ENGINE

COMPUTERS IN ENGINE DESIGN
HS-027 518

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

DIESEL ENGINE DESIGN CONCEPTS FOR THE 1980'S
HS-027 516

DIESEL ENGINE MANUFACTURING IN THE 1980'S
HS-027 517

DIESEL ENGINE THERMAL LOADING
HS-027 423

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

ENGINE TECHNOLOGY FOR THE 1980'S. ENGINEERING KNOW-HOW IN ENGINE DESIGN, PT. 27
HS-027 515

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS
HS-027 437

TROUBLESHOOTING LACK OF ENGINE POWER
HS-028 553

ENGINEERING

ENGINE TECHNOLOGY FOR THE 1980'S. ENGINEERING KNOW-HOW IN ENGINE DESIGN, PT. 27
HS-027 515

ENGINEERS

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

ENGINES

ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT
HS-028 527

MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

STIRLING ENGINES FOR AUTOMOBILES
HS-028 386

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

ENGLAND

M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

ENVIRONMENT

HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

ENVIRONMENTAL

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

EPIDEMIC

MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC
HS-028 530

EQUATION

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

EQUIPMENT

A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

SELECTING EQUIPMENT FOR FAILURE ANALYSIS
HS-027 513

ERROR

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

ESTIMATES

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

EVALUATION

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

ENERGY POLICY IMPACT EVALUATION
HS-028 510

EVALUATION OF SAFETY SYMBOLS
HS-027 414

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

55 MPH IMPACT PROGRAM EVALUATION. PHASE 1 SUMMARY REPORT
HS-805 213

EXPENDITURE

BEARING LIFE EXPENDITURE DURING RUNNING-IN
HS-027 512

EXPERIMENT

SOME DIESEL PISTON FEATURES IN DESIGN ANALYSIS AND EXPERIMENT
HS-027 434

EXPERIMENTAL

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

EXPLORATORY

AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

EXPLOSION

EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

EXTERNAL

BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

EYE
DRIVER EYE HEIGHT: A FIELD STUDY
HS-027 492

FAILURE
POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS
HS-027 514

SELECTING EQUIPMENT FOR FAILURE ANALYSIS
HS-027 513

FATAL
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

FATALITIES
A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

FATIGUE
A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

FATIGUE RESISTANCE TESTING AND FORECASTING
HS-027 507

LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

FEDERAL
SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

FERROUS
A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

FIELD
DRIVER EYE HEIGHT: A FIELD STUDY
HS-027 492

FIGHT
THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT
HS-027 476

FINITE
STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

FISCAL
U.S. DEPARTMENT OF TRANSPORTATION ANNUAL REPORT (NO. 12), FISCAL YEAR 1978
HS-028 542

FLEET
REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

FLOW
DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

FLYWHEEL
THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

FORCE
THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS
HS-027 437

FORCES
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

OCCUPANT-VS-AIRBAG FORCES MEASURED
HS-027 504

FORD
FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

FORECASTING
AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

FATIGUE RESISTANCE TESTING AND FORECASTING
HS-027 507

FOREIGN
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

FREEWAY
FREEWAY TRAFFIC MANAGEMENT. FINAL REPORT
HS-027 473

FRONT
TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS
HS-028 543

FUEL
CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

THE FUEL-SAVING SHAPE OF CARS TO COME
HS-027 497

VEHICLE FUEL ECONOMY REVIEW
HS-027 499

FUELS
AUTOMOTIVE FUELS FOR THE 1980'S
HS-027 519

FUN
LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB
HS-027 475

FUNKTION
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

GASOHOL
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

GASOHOL. A TECHNICAL MEMORANDUM
HS-027 482

GASOLINE
AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440

GAUGE
VACUUM GAUGE: A TOP-NOTCH TROUBLESHOOTER
HS-028 533

GEAR
DIAGNOSTICS OF GEAR ASSEMBLY--A NEW APPROACH USING IMPACT ANALYSIS
HS-028 395

GENEVA
VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

GOODS
HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

GOVERNMENT
JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.
HS-027 471

GOVERNOR
THE TRUCK ELECTRONIC GOVERNOR SYSTEM
HS-027 464

GRAPHICS
POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS
HS-027 514

GROWTH
FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

GUIDE
A GUIDE TO REPORTING HIGHWAY STATISTICS
HS-027 448

PARATRANSIT RESOURCE GUIDE
HS-028 539

THE CAR BOOK: A CONSUMER'S GUIDE TO CAR BUYING
HS-805 580

GUIDEWAY
AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

GUIDING
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

HANDLING
AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

HAPPINESS
WILL THERE EVER BE HAPPINESS IN TIRE LAND?
HS-028 504

HARDNESS

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

HAZARD

ROAD ACCIDENTS: ARE DRUGS OTHER THAN ALCOHOL A HAZARD?
HS-027 444

HEAD

HEAD ON. PAINTED IN SAFETY (MOTORCYCLE VISIBILITY)
HS-028 552

HEADLAMP

"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

HEADWAY

AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

HEARING

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

HEAT

ADVANCED APPROACHES FOR HEAT TRANSFER CALCULATIONS
HS-027 429

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

HEAVY

HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

HEIGHT

DRIVER EYE HEIGHT: A FIELD STUDY
HS-027 492

HEIGHTS

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

HELMET

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481

THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT
HS-027 476

HIGHWAY

A GUIDE TO REPORTING HIGHWAY STATISTICS
HS-027 448

ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980
HS-805 294

ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW
HS-805 173

AUTOMATIC LONGITUDINAL CONTROL OF HIGHWAY VEHICLES
HS-027 455

CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES
HS-027 495

HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

HIGHWAYS

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

HOUSE

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

HWY

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

HYDROGEN

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

IDENTIFICATION

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

IEEE

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

IGNITION

IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

ILLINOIS

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

IMPACT

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

DIAGNOSTICS OF GEAR ASSEMBLY--A NEW APPROACH USING IMPACT ANALYSIS
HS-028 395

ENERGY POLICY IMPACT EVALUATION
HS-028 510

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481

THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

55 MPH IMPACT PROGRAM EVALUATION. PHASE 1 SUMMARY REPORT
HS-805 213

IMPACTS

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

BUMPER IMPACTS STUDIED VIA COMPUTER
HS-027 503

IMPLICATIONS

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

IMPORTANCE

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

IMPROVE

DIESEL-STIRLING COMBINATION MAY IMPROVE EFFICIENCY
HS-027 506

IMPROVEMENT

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

INDEX

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

INDICATOR

ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

INDIRECT

HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

INDUCTIVE

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

INDUSTRY

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

INFORMATION

MOTORIST INFORMATION NEEDS IN WORK ZONES
HS-027 494

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

INITIATION

FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

INJURIES

HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

SPINAL CORD INJURIES AS A RESULT OF MOTORCYCLE ACCIDENTS
HS-027 446

INSPECTION

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

INSPECTIONS

1978 ROADSIDE VEHICLE INSPECTIONS
HS-028 521

INSTANTANEOUS

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

INSTITUTE

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

INSURANCE

INSURANCE FACTS. 1979 ED.
HS-028 508

INTENSITY

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

INTERFERENCE

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

INTERIORS

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

INTERNAL

BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT
HS-028 527

INTERPRETATION

THE INTERPRETATION OF COLLISION SCRATCH MARKS
HS-028 548

INTERSECTIONS

DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS
HS-027 496

INTERSTATE

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

INVESTIGATION

AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

MOTORCYCLE ACCIDENT INVESTIGATION 1975, 1976, 1977, 1978. A FOUR YEAR ANALYSIS OF MOTORCYCLE SAFETY IN UTAH
HS-028 385

INVESTIGATIONS

INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

INVOLVEMENT

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

IRON

BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES
HS-028 531

ISLAND

A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

ISSUE

CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.
HS-803 819

GENERAL SAFETY BELT USAGE. ISSUE PAPER. REV. ED.
HS-803 824

MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER
HS-805 255

JAPAN

STATISTICS '78 OF ROAD TRAFFIC ACCIDENTS IN JAPAN
HS-027 472

JAPANESE

JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.
HS-027 471

JUNCTION

HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

JUNCTIONS

ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS
HS-027 489

KILLERS

KILLERS ON THE ROAD
HS-028 389

KILOMETERS

VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

KINGDOM

HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

KWE

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

LABORATORY

LABORATORY STUDIES OF LANE OCCUPANCY SIGNS
HS-028 534

LACK

TROUBLESHOOTING LACK OF ENGINE POWER
HS-028 553

LAND

WILL THERE EVER BE HAPPINESS IN TIRE LAND?
HS-028 504

LANE

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

LABORATORY STUDIES OF LANE OCCUPANCY SIGNS
HS-028 534

LANES

M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

LARAMIE

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

LAW
IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451
IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481
THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT
HS-027 476

LAWS
ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW
HS-805 173
ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486
LEGAL BUT LETHAL (BRITISH TIRE LAWS)
HS-027 420

LEARNING
LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB
HS-027 475

LEGAL
LEGAL BUT LETHAL (BRITISH TIRE LAWS)
HS-027 420

LEGISLATION
EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

LETHAL
LEGAL BUT LETHAL (BRITISH TIRE LAWS)
HS-027 420

LEVEL
BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

LIABILITY
HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES
HS-027 495

LICENSING
MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER
HS-805 255

LIFE
BEARING LIFE EXPENDITURE DURING RUNNING-IN
HS-027 512
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393
SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

LIGHT
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

LIGHTNING
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

LIGHTWEIGHT
COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

LIMIT
ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

LIMITS
EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

LIQUID
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

LITTLE
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

LIVES
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

LOAD
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

LOADED
STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

LOADING
DIESEL ENGINE THERMAL LOADING
HS-027 423
PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

LOCAL
DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

LOCKING
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

LOGICAL
THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

LONG
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

LONGITUDINAL
AUTOMATIC LONGITUDINAL CONTROL OF HIGHWAY VEHICLES
HS-027 455

LOSS
EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

LOW
HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

MAINTENANCE
CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

MALES
MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC
HS-028 530

MANAGEMENT
FREEWAY TRAFFIC MANAGEMENT. FINAL REPORT
HS-027 473

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

MANUAL
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

MANUFACTURING
DIESEL ENGINE MANUFACTURING IN THE 1980'S
HS-027 517

MARKETPLACE
VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

MARKINGS
ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS
HS-027 489

MARKS
THE INTERPRETATION OF COLLISION SCRATCH MARKS
HS-028 548

MATCHING
RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

MATERIALS
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

MEAN
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

MEANS

INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

MEASURED

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

OCCUPANT-VS-AIRBAG FORCES MEASURED
HS-027 504

MEASURES

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

MEMORANDUM

GASOHOL. A TECHNICAL MEMORANDUM
HS-027 482

METALS

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

METHODS

AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

METROPOLITAN

CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

MICROPROCESSOR

MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

MICROWAVE

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

MICROWAVES

EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT
HS-028 527

MILLION

THE $200 MILLION CAR
HS-027 418

MODEL

FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

MODELS

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

MODERN

MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC
HS-028 530

MODES

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

MOTOR

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

A.C. (ALTERNATING CURRENT) MOTOR CONTROL FOR ADVANCED ELECTRIC VEHICLES
HS-028 507

AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

MOTOR TRUCKS OF AMERICA. 1ST ED.
HS-028 520

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR

INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

MOTORCYCLE

A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

HEAD ON. PAINTED IN SAFETY (MOTORCYCLE VISIBILITY)
HS-028 552

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481

MOTORCYCLE ACCIDENT INVESTIGATION 1975, 1976, 1977, 1978. A FOUR YEAR ANALYSIS OF MOTORCYCLE SAFETY IN UTAH
HS-028 385

MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC
HS-028 530

MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER
HS-805 255

SPINAL CORD INJURIES AS A RESULT OF MOTORCYCLE ACCIDENTS
HS-027 446

THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT
HS-027 476

MOTORCYCLIST

CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 498

MOTORIST

MOTORIST INFORMATION NEEDS IN WORK ZONES
HS-027 494

STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

MOTORISTS

ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

MOVE

THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS
HS-027 437

MOVEMENTS

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

MPH

ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

55 MPH IMPACT PROGRAM EVALUATION. PHASE 1 SUMMARY REPORT
HS-805 213

MULTIMODAL

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

MULTIPLE

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

MULTIPROCESSOR

MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

MULTIVARIATE

MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

NARROW

M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

NATIONAL

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980
HS-805 294

ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW
HS-805 173

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

LEARNING IS FUN WITH THE NATIONAL SAFETY COUNCIL'S CHILD SAFETY CLUB
HS-027 475

NATIONAL TRANSPORTATION SAFETY BOARD. ANNUAL REPORT TO CONGRESS, 1979
HS-028 541

REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

NATURE
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

NEVER
CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

NHTSA
A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

NICKEL
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

NIGHTTIME
ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

NIIGATA
THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

NOISE
IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

VEHICLE NOISE AND THE PASSENGER
HS-027 502

NOMINAL
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

NORWAY
SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

NOTCH
VACUUM GAUGE: A TOP-NOTCH TROUBLESHOOTER
HS-028 533

NOTCHED
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

NTS
THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

OBSERVATIONS
AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

OBSOLETE
CARS AND ROADS: UP-TO-DATE OR OBSOLETE?
HS-027 421

OCCUPANCY
LABORATORY STUDIES OF LANE OCCUPANCY SIGNS
HS-028 534

OCCUPANT
OCCUPANT-VS-AIRBAG FORCES MEASURED
HS-027 504

OCULAR
EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

OIL
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

ONGOING
CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

ONTARIO
EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

OPERATION
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

OPERATOR
MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER
HS-805 255

OPINIONS

ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

ORLEANS

REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

OUTPUT

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

OVERDRIVE

DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

OVERVIEW

ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW
HS-805 173

OWNERSHIP

AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

PAINT

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

PAINTED

HEAD ON. PAINTED IN SAFETY (MOTORCYCLE VISIBILITY)
HS-028 552

PAPER

CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.
HS-803 819

GENERAL SAFETY BELT USAGE. ISSUE PAPER. REV. ED.
HS-803 824

JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.
HS-027 471

MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER
HS-805 255

PARAMETER

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

PARATRANSIT

PARATRANSIT RESOURCE GUIDE
HS-028 539

PART

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

PARTIAL

EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

PASSENGER

ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

THE SEATED BUS PASSENGER--A REVIEW
HS-027 470

THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

VEHICLE NOISE AND THE PASSENGER
HS-027 502

PASSIVE

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

PASSIVE RESTRAINTS ARE CALLED ANSWER FOR THOSE PEOPLE WHO WON'T BUCKLE UP
HS-027 500

PATIENTS

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

PATTERN

TRAVEL BEHAVIOR AND THE TOTAL ACTIVITY PATTERN
HS-028 524

PEDESTRIAN

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

PEDESTRIANS

A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS
HS-027 496

PEDIATRICS

REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

PEENING

SHOT PEENING--AN ADDED DIMENSION
HS-027 509

PEOPLE

PASSIVE RESTRAINTS ARE CALLED ANSWER FOR THOSE PEOPLE WHO WON'T BUCKLE UP
HS-027 500

PERCEIVED

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

PERCEPTION

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

PERCEPTUAL

PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

PERFORMANCE

EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT
HS-028 527

THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

PERFORMING

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

PERSONENWAGEN

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

PHOTOELASTICITY

INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

PISTON

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

SOME DIESEL PISTON FEATURES IN DESIGN ANALYSIS AND EXPERIMENT
HS-027 434

PISTONS

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

PLANNED

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

PLASTIC

PLASTIC GETS TOUGH
HS-028 503

POLICIES

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

POLICY

AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

ENERGY POLICY IMPACT EVALUATION
HS-028 510

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

POST

POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS
HS-027 514

POWER

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS
HS-028 522

TROUBLESHOOTING LACK OF ENGINE POWER
HS-028 553

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION

STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

PREDICTION

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

PREDICTIVE

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

PREFERENTIAL

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

PRESSURE

ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

PREVENTION

CAUSES AND PREVENTION OF ROAD ACCIDENTS
HS-027 447

PRIORITY

ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS
HS-027 489

DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

PRIVATE

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

PROBLEM

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

PROBLEMS

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

PROCEDURE

QUICK AND DIRTY VEHICLE ROUTING PROCEDURE
HS-028 523

PROCEDURES

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

PROCESSING

POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS
HS-027 514

PRODUCTION

BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES
HS-028 531

PROGRAMMED

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

PROPULSION

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

PROTECTION

AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

CRASH PROTECTION IN ROAD ACCIDENTS
HS-028 390

PROTECTORS

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

PROTOTYPE

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

PSYCHIATRIC

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

PUBLIC

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED.

REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

QUALITY
AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

QUANTITY
HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

QUICK
QUICK AND DIRTY VEHICLE ROUTING PROCEDURE
HS-028 523

RADAUFHANGUNG
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

RADIO
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

RADIOLOGICAL
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

RADLASTEN
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

RAIL
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

RAMPS
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

RANDOM
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

RANKINE
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

RAPID
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

RATED
RULES OF THE ROAD RATED
HS-805 225

RECIPROCATOR
15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

RECONSTRUCTION
M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

RECORD
IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

RECORDS
STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

RECREATIONAL
ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

REDUCED
PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

REDUCING
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

REDUCTION

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

REGULATION

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

REGULATORY

FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

RELIABILITY

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

REPAIR

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

REPEAL

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481

RESEARCH

ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

RESISTANCE

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

FATIGUE RESISTANCE TESTING AND FORECASTING
HS-027 507

RESOURCE

PARATRANSIT RESOURCE GUIDE
HS-028 539

RESPONSES

CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

RESTRAINT

CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.
HS-803 819

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

RESTRAINTS

PASSIVE RESTRAINTS ARE CALLED ANSWER FOR THOSE PEOPLE WHO WON'T BUCKLE UP
HS-027 500

SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?
HS-027 443

THE DIFFICULT AGE (SAFETY RESTRAINTS FOR CHILDREN)
HS-027 422

RESULT

SPINAL CORD INJURIES AS A RESULT OF MOTORCYCLE ACCIDENTS
HS-027 446

RESULTS

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

REVIEW

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES
HS-027 495

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

THE SEATED BUS PASSENGER--A REVIEW
HS-027 470

VEHICLE FUEL ECONOMY REVIEW
HS-027 499

RHODE

A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

RISES
BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES
HS-028 531

ROAD
CAUSES AND PREVENTION OF ROAD ACCIDENTS
HS-027 447

COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

CRASH PROTECTION IN ROAD ACCIDENTS
HS-028 390

KILLERS ON THE ROAD
HS-028 389

ROAD ACCIDENTS: ARE DRUGS OTHER THAN ALCOHOL A HAZARD?
HS-027 444

RULES OF THE ROAD RATED
HS-805 225

SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

STATISTICS '78 OF ROAD TRAFFIC ACCIDENTS IN JAPAN
HS-027 472

ROADS
CARS AND ROADS: UP-TO-DATE OR OBSOLETE?
HS-027 421

ROADSIDE
1978 ROADSIDE VEHICLE INSPECTIONS
HS-028 521

ROADWAY
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

ROLL
MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

ROLLING
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

ROUTING
QUICK AND DIRTY VEHICLE ROUTING PROCEDURE
HS-028 523

RULE
SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

RULES
RULES OF THE ROAD RATED
HS-805 225

RUNAWAY
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

RUNNING
BEARING LIFE EXPENDITURE DURING RUNNING-IN
HS-027 512

SAE
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

SAFE
BUT ARE THEY SAFE DRIVERS...? (TRUCKING SAFETY)
HS-028 551

SAFFETY
A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

SALE
SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

SAMPLES
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

SAVING
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

THE FUEL-SAVING SHAPE OF CARS TO COME
HS-027 497

SAVINGS
PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

SCALING
SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

SCHOOL
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

SCHOOLS
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

SCIENCE
PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

SCOPE
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

SCRATCH
THE INTERPRETATION OF COLLISION SCRATCH MARKS
HS-028 548

SEAT
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502
SEAT-BELTS. A STUDY OF THEIR EFFECT ON 3,000 ACCIDENTS
HS-028 383

SEATBELT
EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

SEATED
THE SEATED BUS PASSENGER--A REVIEW
HS-027 470

SECRETARY
COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789
HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

SEITENKRAFTE
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

SELECTING
SELECTING EQUIPMENT FOR FAILURE ANALYSIS
HS-027 513

SENATE
PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

SERIES
CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266
CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

SERVICE
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

SEVERITY
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

SHAPE
THE FUEL-SAVING SHAPE OF CARS TO COME
HS-027 497

SHEET
THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET
HS-805 307

SHOT
SHOT PEENING--AN ADDED DIMENSION
HS-027 509

SIDE
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

SIGNALIZED
THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS
HS-027 496

SIGNS
LABORATORY STUDIES OF LANE OCCUPANCY SIGNS
HS-028 534

SIZE
DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

SKILLS
PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

SKYROCKETS
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

SNOWMOBILE
SNOWMOBILE BASICS
HS-028 532

SOCIAL
SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

SOCIETY
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

SODIUM
FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

SOLAR
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

SOUNDS
THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

SOURCES
VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

SPACING
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

SPECIMENS
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

SPECTRUM
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

SPEED
ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

SPINAL
SPINAL CORD INJURIES AS A RESULT OF MOTORCYCLE ACCIDENTS
HS-027 446

SPINE
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

SPRING
REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

STAFF
SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

STAFFORDSHIRE
M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

STANDARDS
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS
HS-027 437

STATEMENT
PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

STATES
AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440

IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

STATIONARY

DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

STATISTICS

A GUIDE TO REPORTING HIGHWAY STATISTICS
HS-027 448

STATISTICS '78 OF ROAD TRAFFIC ACCIDENTS IN JAPAN
HS-027 472

STEAM

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

STEELS

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

STEERING

THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

STIRLING

ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

DIESEL-STIRLING COMBINATION MAY IMPROVE EFFICIENCY
HS-027 506

STIRLING ENGINES FOR AUTOMOBILES
HS-028 386

STORAGE

DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

STRAIN

SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

STRATEGIES

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

STREETS

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

STRENGTH

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

STRUCTURAL

A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

VEHICLE STRUCTURAL ANALYSIS: A SURVEY
HS-028 547

STRUCTURES

FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

STUDIED

BUMPER IMPACTS STUDIED VIA COMPUTER
HS-027 503

SUBCOMMITTEE

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

SUBURBAN

ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS
HS-027 489

SULFUR

FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

SUPERCHARGED
PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

SUPERIOR
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

SUPPRESSION
EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

SURVEY
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

VEHICLE STRUCTURAL ANALYSIS: A SURVEY
HS-028 547

SURVEYS
THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET
HS-805 307

SURVIVE
CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 498

SUSPENSION
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS
HS-028 522

SWITZERLAND
VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

SYMBOLS
EVALUATION OF SAFETY SYMBOLS
HS-027 414

SYNDROME
CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 498

SYSTEMATIC
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

TAILGATE
COMPUTER AIDS LIGHTWEIGHT COMPONENT DESIGN (APPLICATION TO AN AUTOMOBILE TAILGATE)
HS-027 505

TANK
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

TAXATION
HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

TECHNOLOGY
ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

ENGINE TECHNOLOGY FOR THE 1980'S. ENGINEERING KNOW-HOW IN ENGINE DESIGN, PT. 27
HS-027 515

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

TEENAGE
MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC
HS-028 530

TELEPHONE
HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM
HS-027 462

TEMPERATURE
DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

TENNESSEE

THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

TESTING

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

FATIGUE RESISTANCE TESTING AND FORECASTING
HS-027 507

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

TESTS

DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

THEORETICAL

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

THERMAL

DIESEL ENGINE THERMAL LOADING
HS-027 423

PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

THERMALLY

STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

THROMBOSIS

SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

TIRE

LEGAL BUT LETHAL (BRITISH TIRE LAWS)
HS-027 420

TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS
HS-028 543

WILL THERE EVER BE HAPPINESS IN TIRE LAND?
HS-028 504

TITLE

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

TOP

VACUUM GAUGE: A TOP-NOTCH TROUBLE-SHOOTER
HS-028 533

TOUGH

PLASTIC GETS TOUGH
HS-028 503

TOWN

"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

TRADE

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

TRAFFIC

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980
HS-805 294

CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

FREEWAY TRAFFIC MANAGEMENT. FINAL REPORT
HS-027 473

HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

STATISTICS '78 OF ROAD TRAFFIC ACCIDENTS IN JAPAN
HS-027 472

THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

TRANSDUCERS

HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

TRANSFER

ADVANCED APPROACHES FOR HEAT TRANSFER CALCULATIONS
HS-027 429

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

TRANSIT

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

TRANSIT FACT BOOK. 1978-1979 ED.
HS-028 391

TRANSMISSION

DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS
HS-028 522

TRANSMISSIONS

THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

TRANSPORTATION

APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

IMPACT OF HELMET LAW REPEAL. REPORTS GIVEN ON DOT (DEPARTMENT OF TRANSPORTATION) 4-STATE MOTORCYCLE HELMET STUDY
HS-027 451

JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.
HS-027 471

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

NATIONAL TRANSPORTATION SAFETY BOARD. ANNUAL REPORT TO CONGRESS, 1979
HS-028 541

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET
HS-805 307

U.S. DEPARTMENT OF TRANSPORTATION ANNUAL REPORT (NO. 12), FISCAL YEAR 1978
HS-028 542

TRAUMA
EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

TRAVEL
DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

TRAVEL BEHAVIOR AND THE TOTAL ACTIVITY PATTERN
HS-028 524

TRAVELED
VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

TREATMENT
TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT
HS-027 416

TREATMENTS
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

TROUBLESHOOTER
VACUUM GAUGE: A TOP-NOTCH TROUBLESHOOTER
HS-028 533

TROUBLESHOOTING
TROUBLESHOOTING LACK OF ENGINE POWER
HS-028 553

TRUCK
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

THE TRUCK ELECTRONIC GOVERNOR SYSTEM
HS-027 464

TRUCKING
BUT ARE THEY SAFE DRIVERS...? (TRUCKING SAFETY)
HS-028 551

TRUCKS
ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

MOTOR TRUCKS OF AMERICA. 1ST ED.
HS-028 520

TRY
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

TSM
MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

TURBINE
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

TURBOCHARGED
RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

TYPES
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

TYRE
TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS
HS-028 543

UNIFIED
A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

UNIFORM
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

UNIT
ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT
HS-027 416

UNITED
HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

URBAN

DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS
HS-028 522

USAGE

CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.
HS-803 819

GENERAL SAFETY BELT USAGE. ISSUE PAPER. REV. ED.
HS-803 824

USES

SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?
HS-027 443

UTAH

MOTORCYCLE ACCIDENT INVESTIGATION 1975, 1976, 1977, 1978. A FOUR YEAR ANALYSIS OF MOTORCYCLE SAFETY IN UTAH
HS-028 385

VACUUM

VACUUM GAUGE: A TOP-NOTCH TROUBLESHOOTER
HS-028 533

VANPOOL

AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

VARIABILITY

AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440

VARIATION

ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

VEHICLE

A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES
HS-028 531

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

QUICK AND DIRTY VEHICLE ROUTING PROCEDURE
HS-028 523

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

VEHICLE FUEL ECONOMY REVIEW
HS-027 499

VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

VEHICLE NOISE AND THE PASSENGER
HS-027 502

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR

INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

VEHICLE STRUCTURAL ANALYSIS: A SURVEY
HS-028 547

1978 ROADSIDE VEHICLE INSPECTIONS
HS-028 521

VEHICLES

"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

A.C. (ALTERNATING CURRENT) MOTOR CONTROL FOR ADVANCED ELECTRIC VEHICLES
HS-028 507

AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

AUTOMATIC LONGITUDINAL CONTROL OF HIGHWAY VEHICLES
HS-027 455

CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS
HS-027 496

VEHICULAR

AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

VIBRATIONS

TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS
HS-028 543

VIOLATIONS

THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

VIOLATOR

THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

VISIBILITY

CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 498

HEAD ON. PAINTED IN SAFETY (MOTORCYCLE VISIBILITY)
HS-028 552

VISION

COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

VOLUME

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

WARNING

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

WASHINGTON

REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

WEATHER

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

WET

DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

WHEEL

EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS
HS-028 543

WHITE

GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.
HS-027 471

WORK

MOTORIST INFORMATION NEEDS IN WORK ZONES
HS-027 494

WORKSHOP

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

WORKZONE

HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES
HS-027 495

WORLD

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

WROUGHT

A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

WYOMING

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

YORK

FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

YOUNG

CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

ZINC

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

ZONE

HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

ZONES

CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

MOTORIST INFORMATION NEEDS IN WORK ZONES
HS-027 494

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Author Index

Abe, Masato
THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

Abrahamson, Tony
DRIVER EYE HEIGHT: A FIELD STUDY
HS-027 492

Abrams, Charles M.
MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

Alker, George J. , Jr.
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

Allen, Merton , ed
ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

Amor, A. J.
KILLERS ON THE ROAD
HS-028 389

Anderson, Mary
TREATMENT IN AN ALCOHOLISM AND DRUG ADDICTION UNIT
HS-027 416

Audette, R. J.
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICATION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. 1: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

Avery, J. G.
MOTORCYCLE ACCIDENTS IN TEENAGE MALES. A MODERN EPIDEMIC
HS-028 530

Baker, Susan P.
CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

Baldauf, F. K.
SHOT PEENING--AN ADDED DIMENSION
HS-027 509

Begovich, Connie
MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

Beltrami, M.
MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

Bendixson, Terence
CARS AND ROADS: UP-TO-DATE OR OBSOLETE?
HS-027 421

Beremand, Donald G.
STIRLING ENGINES FOR AUTOMOBILES
HS-028 386

Bille, Mogens
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

Bland, Timothy J.
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

Blomberg, Richard D.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

Blumentritt, Charles W.
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Boardman, Bruce E.
SELECTING EQUIPMENT FOR FAILURE ANALYSIS
HS-027 513

Bobbett, R. E.
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

Bolger, J. G.
TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

Brobeck, William M.
AUTOMATIC LONGITUDINAL CONTROL OF HIGHWAY VEHICLES
HS-027 455

Broek, D.
FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

Brueggert, M. S.
POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS
HS-027 514

Bryan, M. E.
VEHICLE NOISE AND THE PASSENGER
HS-027 502

Button, K. J.
AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

HEAVY GOODS VEHICLE TAXATION IN THE UNITED KINGDOM
HS-028 526

Byers, D. J.
A.C. (ALTERNATING CURRENT) MOTOR CONTROL FOR ADVANCED ELECTRIC VEHICLES
HS-028 507

Callahan, Joseph M.
BEHIND THE IRON CURTAIN: VEHICLE PRODUCTION RISES
HS-028 531

Callaway, Donald
SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

Cambell, B. J.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

Capelle, Donald G.
FREEWAY TRAFFIC MANAGEMENT. FINAL REPORT
HS-027 473

IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

Carroll, Carol L.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

Carter, Jay , Jr.
15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

Cherchas, D. B.
DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

Chomitz, Kenneth
SURVEY AND ANALYSIS OF ENERGY INTENSITY ESTIMATES FOR URBAN TRANSPORTATION MODES
HS-028 512

Claybrook, Joan
PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

Collins, Belinda L.
EVALUATION OF SAFETY SYMBOLS
HS-027 414

Cook, Allen R.
PARATRANSIT RESOURCE GUIDE
HS-028 539

Council, Forrest M.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

Courtney, R. L.
AUTOMOTIVE FUELS FOR THE 1980'S
HS-027 519

Cunagin, Wiley
DRIVER EYE HEIGHT: A FIELD STUDY
HS-027 492

Czinczel, Armin
ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

Dajee, Himmet
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

Derikart, Therese , ed.
ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

Derouin, Charles R.
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

Desper, Linda P.
CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

Dimarogonas, A.
BEARING LIFE EXPENDITURE DURING RUNNING-IN
HS-027 512

DiRenzo, John F.
AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

Doll, C. Loren
QUICK AND DIRTY VEHICLE ROUTING PROCEDURE
HS-028 523

Drill, Burton F.
HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

Drucker, Charles
SOCIAL CONSEQUENCES OF ACCIDENTS. FINAL REPORT
HS-805 214

Dubin, Robin
MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

Dunham, Janet R.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

Dupont, Annalise
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

Dutt, Amitabh K.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

Edgerton, Jerry
THE FUEL-SAVING SHAPE OF CARS TO COME
HS-027 497

Engel, Ray
DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

Escher, William J. D.
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

Estep, Alvord C.
CALIFORNIA'S SAFETY EFFORTS--PAST AND PRESENT (HIGHWAY CONSTRUCTION AND MAINTENANCE ZONES)
HS-027 493

Faulkner, C. R.
ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS
HS-027 489

Fenton, Robert E.
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

Fieger, Johann
DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

Fleming, Allyn
HEAD ON. PAINTED IN SAFETY (MOTORCYCLE VISIBILITY)
HS-028 552

Fowkes, A. S.
AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

Fraser, J. Perry , ed.
ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

Gaddie, James C.
IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

Gassner, Ernst
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

Glimm, Jochen
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

Glines, Stephen W.
MOTORCYCLE ACCIDENT INVESTIGATION 1975, 1976, 1977, 1978. A FOUR YEAR ANALYSIS OF MOTORCYCLE SAFETY IN UTAH
HS-028 385

Goldschmidt, Neil
ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

Gordon, Donald A.
LABORATORY STUDIES OF LANE OCCUPANCY SIGNS
HS-028 534

Green, Nancy
DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

Green, Paul
ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

Greene, David L.
AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440
MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

Greene, J. E.
AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

Griffin, Lindsay I. , 3rd.
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Hale, Allen
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

Hankins, Kenneth C.
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Harder, Glenn A.
AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

Harrer, S.
COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

Hartgen, David T.
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

Heathington, K. W.
THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

Henson, Donald L.
PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

Hoffmann, Errol R.
SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

Hohenberg, Gunter F.
ADVANCED APPROACHES FOR HEAT TRANSFER CALCULATIONS
HS-027 429

Hopkins, Priscilla
CAUSES AND PREVENTION OF ROAD ACCIDENTS
HS-027 447

Horne, C. Franklin
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

Huebner, Kenneth H.
COMPUTERS IN ENGINE DESIGN
HS-027 518

Hughes, E. C.
THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

Hulsing, K. L.
DIESEL ENGINE DESIGN CONCEPTS FOR THE 1980'S
HS-027 516

Humphreys, Jack B.
HIGHWAY LIABILITY--A REVIEW OF WORKZONE ACCIDENT CASES
HS-027 495

Inoue, Hiroshi
THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

Ishiyama, S.
ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

Ivey, Don L.
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Iype, Mohan O.
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

Jacklin, D.
METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

Jones, David W.
AN EXPLORATORY STUDY OF ATTITUDES AND OBSERVATIONS ON CHILD PROTECTION IN MOTOR VEHICLES
HS-027 480

Jones, Sydney
THE URBAN CAR AND ITS POWER TRANSMISSION AND SUSPENSION SYSTEMS
HS-028 522

Kamata, Shohichi
MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

Kameda, Kazuhiko
MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

Kamel, M.
HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

Kanter, Lawrence , ed.
SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

Karwacki, Jerome J. , Jr.
CHILDREN IN MOTOR VEHICLES. NEVER TOO YOUNG TO DIE
HS-028 381

Kastrup, Marianne
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

Kearney, Edward F.
RULES OF THE ROAD RATED
HS-805 225

Kelsey, Shara Lynn
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

Kennedy, J. F.
THE TRUCK ELECTRONIC GOVERNOR SYSTEM
HS-027 464

Kerwin, W.
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

Kewman, Donald G.
PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

Kikuchi, T.
HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM
HS-027 462

Kimura, Yoshinori
MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

Klein, Richard E.
AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

Klouda, James C.
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

Knapp, Beverly G.
MOTORIST INFORMATION NEEDS IN WORK ZONES
HS-027 494

Konomi, T.
ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

Kramer, Edward Lovett
THE GREAT ARKANSAS MOTORCYCLE HELMET LAW FIGHT
HS-027 476

Kubacki, Michael
ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

Kubo, S.
DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

Kubota, H.
HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM
HS-027 462

Lamar, Paul
MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

Lansky, David
BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

Lawson, David M.
BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

LaHeist, Warren G.
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

Leiber, Heinz
ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

Leis, B. N.
FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

Leslie, Eugene V.
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

Levis, J. A.
THE SEATED BUS PASSENGER--A REVIEW
HS-027 470

Lieber, Heinz
ELECTRONIC DIGITAL ANTI-LOCKING SYSTEM FOR PASSENGER CARS, ITS DESIGN AND OPERATION (ANTIBLOCKIERSYSTEM FUR PERSONENWAGEN MIT DIGITALER ELEKTRONIK--AUFBAU UND FUNKTION)
HS-028 519

Lipp, Wilhelm
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

Losee, John M.
A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

Ludwig, Saul
WILL THERE EVER BE HAPPINESS IN TIRE LAND?
HS-028 504

Lummis, Michael
IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481

Lund, Hans
TRAFFIC ACCIDENTS INVOLVING PSYCHIATRIC PATIENTS. CHARACTERISTICS OF ACCIDENTS INVOLVING DRIVERS WHO HAVE BEEN ADMITTED TO DANISH PSYCHIATRIC DEPARTMENTS
HS-027 413

Lynn, David K.
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

MICROPROCESSOR-BASED SYSTEM FOR ROLLDOWN AND ACCELERATION TESTS
HS-027 460

Lytton, Robert L.
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Maclean, A. D.
M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

MacDonald, Wendy A.
SCALING PERCEIVED DISTANCE ALONG A ROAD
HS-027 478

MacKillop, H. I.
EFFECTS OF SEATBELT LEGISLATION AND REDUCTION OF HIGHWAY SPEED LIMITS IN ONTARIO
HS-027 449

Mailer, Robert
DIESEL ENGINE MANUFACTURING IN THE 1980'S
HS-027 517

Margiotta, Richard A.
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

Marre, M.
COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

Martin, Alan M.
THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

Mason, Anthony K.
A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

Masson, Arthur L.
AUTOMATIC CAR-FOLLOWING--A STUDY OF POSSIBLE CONTROLLERS
HS-027 454

Massouros, G.
BEARING LIFE EXPENDITURE DURING RUNNING-IN
HS-027 512

McAlevy, Robert F. , 3rd.
THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

McCormick, J. B.
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

McElroy, John
THE 80S. STANDARDS FORCE MOVE TO ELECTRONIC ENGINE CONTROLS
HS-027 437

McSwain, Norman E. , Jr.
IMPACT OF MOTORCYCLE HELMET LAW REPEAL
HS-027 481

Mitchell, M. R.
A UNIFIED PREDICTIVE TECHNIQUE FOR THE FATIGUE RESISTANCE OF CAST FERROUS-BASED METALS AND HIGH HARDNESS WROUGHT STEELS
HS-027 511

Mitschke, Manfred
EFFECT OF WHEEL SUSPENSION TYPES ON WHEEL LOAD AND SIDE FORCES (EINFLUSS DER RADAUFHANGUNG AUF RADLASTEN UND SEITENKRAFTE)
HS-028 509

Moroto, S.
DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

Morse, Peter H.
EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

Mufti, Rasin K.
APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

Munro, Robert
SOME DIESEL PISTON FEATURES IN DESIGN ANALYSIS AND EXPERIMENT
HS-027 434

Munson, Michael J.
APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

Nachamkin, J.
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

Nathan, Peter E.
BLOOD ALCOHOL LEVEL DISCRIMINATION BY ALCOHOLICS: THE ROLE OF INTERNAL AND EXTERNAL CUES
HS-027 477

Neubauer, O.
COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

Newhall, H. K.
AUTOMOTIVE FUELS FOR THE 1980'S
HS-027 519

Newton, Tommy M.
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Ng, L. S.
TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

Nohira, H.
ANALYSIS ON CYCLE-BY-CYCLE VARIATION OF COMBUSTION FROM PRESSURE INDICATOR DATA
HS-028 544

Numazawa, A.
DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

O'Connor, T. Patrick
AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440

Ochsner, Rise D.
EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

Oh, Young S.
HIGH CERVICAL SPINE AND CRANIOCERVICAL JUNCTION INJURIES IN FATAL TRAFFIC ACCIDENTS: A RADIOLOGICAL STUDY
HS-027 479

Olson, Paul L.
ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

Orr, Beverly T.
CHILD RESTRAINT WORKSHOP SERIES. VOLUME 1. FINAL REPORT
HS-805 266

CHILD RESTRAINT WORKSHOP SERIES. VOLUME 2. ONGOING AND PLANNED PROGRAMS. FINAL REPORT
HS-805 267

Pacejka, H. B.
TYRE (TIRE) FACTORS AND FRONT WHEEL VIBRATIONS
HS-028 543

Pain, Richard F.
MOTORIST INFORMATION NEEDS IN WORK ZONES
HS-027 494

Parenti, Robert F.
MOTORCYCLE ACCIDENT INVESTIGATION 1975, 1976, 1977, 1978. A FOUR YEAR ANALYSIS OF MOTORCYCLE SAFETY IN UTAH
HS-028 385

Paskaruk, Sylvia
DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

Pauls, Lonney S.
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271

IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

Pearman, A. D.
AN APPRAISAL OF AGGREGATE AND DISAGGREGATE CAR OWNERSHIP FORECASTING METHODS
HS-028 518

Peck, Raymond C.
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

Pellegrino, E.
MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

Percy, R. F. E.
A RAPID, SYSTEMATIC, AND COMPREHENSIVE CLASSIFICATION SYSTEM FOR THE IDENTIFICA-

TION AND COMPARISON OF MOTOR VEHICLE PAINT SAMPLES. I: THE NATURE AND SCOPE OF THE CLASSIFICATION SYSTEM
HS-027 439

Perry, R. L.
THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

Perry, Robert L.
PLASTIC GETS TOUGH
HS-028 503

Philpot, J. W.
THE USE OF CHILD PASSENGER SAFETY DEVICES IN TENNESSEE
HS-027 474

Pierce, Phil R.
SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

Pierman, Brian C.
EVALUATION OF SAFETY SYMBOLS
HS-027 414

Pless, I. Barry
SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?
HS-027 443

Prashker, Joseph N.
DIRECT ANALYSIS OF THE PERCEIVED IMPORTANCE OF ATTRIBUTES OF RELIABILITY OF TRAVEL MODES IN URBAN TRAVEL
HS-028 525

Pretty, Robert Lindsay
THE DELAY TO VEHICLES AND PEDESTRIANS AT SIGNALIZED INTERSECTIONS
HS-027 496

Preusser, David F.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

Ranky, M. F.
DIAGNOSTICS OF GEAR ASSEMBLY--A NEW APPROACH USING IMPACT ANALYSIS
HS-028 395

Ratz, Michael
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

Reid, J. A.
'TOWN BEAMS' FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

Reilly, Lawrence J.
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

Reinfurt, Donald W.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

Retzko, Hans-Georg
DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

Richardson, I. W.
SEAT BELT AORTA: ACUTE DISSECTION AND THROMBOSIS OF THE ABDOMINAL AORTA
HS-028 502

Roediger, Frank L.
ACCIDENT RESEARCH MANUAL. FINAL REPORT
HS-028 382

Roehrle, Manfred D.
INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

Roghmann, K. J.
SAFETY RESTRAINTS FOR CHILDREN IN AUTOMOBILES: WHO USES THEM?
HS-027 443

Rose, Axel B.
ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

Rubin, Richard B.
AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

Rudman, Leon M.
VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

Sakuragi, Johji
MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

Sander, W.
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

Sandsmark, N.
STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

Sarsten, Arthur
SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

Saugerud, O. T.
STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL

AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

Scalet, R.
MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

Scarnera, M.
MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

Schoeckle, S.
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

Schultz, Mort
TROUBLESHOOTING LACK OF ENGINE POWER
HS-028 553

Schwab, Richard N.
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

Segal, D. J.
AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

Sehitoglu, H.
AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION
HS-027 466

Selby, Earl
WHO NEEDS AIR BAGS?
HS-028 388

Selby, Miriam
WHO NEEDS AIR BAGS?
HS-028 388

Seshadri, T. V.
SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

Shepherd, Richard A.
IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

Sherman, Beverly R.
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

Shindo, Y.
DEVELOPMENT OF A FOUR-SPEED AUTOMATIC TRANSMISSION WITH OVERDRIVE
HS-028 546

Shrosbree, R. D.
SPINAL CORD INJURIES AS A RESULT OF MOTORCYCLE ACCIDENTS
HS-027 446

Sihling, K.
EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

Simons, James F.
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

Singer-Bart, Susan , ed.
ENERGY POLICY IMPACT EVALUATION
HS-028 510

Sivak, Michael
ACCIDENTS AND THE NIGHTTIME CONSPICUITY OF TRUCKS. FINAL REPORT
HS-028 517

PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

Smisek, Ronald R.
AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

Sprunger, John L.
BUT ARE THEY SAFE DRIVERS...? (TRUCKING SAFETY)
HS-028 551

Staats, Elmer B.
POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

Stavro, Barry
THE $200 MILLION CAR
HS-027 418

Stofflet, G. F.
VEHICLE FUEL ECONOMY REVIEW
HS-027 499

Sturner, William Q.
A SURVEY OF RHODE ISLAND MOTORCYCLE FATALITIES DURING 1975-1976
HS-027 445

Taylor, Peter
LEGAL BUT LETHAL (BRITISH TIRE LAWS)
HS-027 420

Tempest, W.
VEHICLE NOISE AND THE PASSENGER
HS-027 502

Tidbury, G. H.
VEHICLE STRUCTURAL ANALYSIS: A SURVEY
HS-028 547

Tobin, Roger
CALCULATION OF FUEL CONSUMPTION DUE TO TRAFFIC CONGESTION IN A CASE-STUDY METROPOLITAN AREA
HS-028 505

Tonke, Ferdinand
DELAYS AT PRIORITY INTERSECTIONS UNDER NON-STATIONARY TRAFFIC FLOW CONDITIONS
HS-028 506

Townsend, M. A.
DETERMINATION OF THE SIZE OF THE STORAGE CHAMBER AND THE CHARGING PRESSURE FOR AIR BAGS USED IN AUTOMOTIVE PASSIVE RESTRAINT SYSTEMS
HS-028 545

Train, Kenneth
CONSUMERS' RESPONSES TO FUEL-EFFICIENT VEHICLES: A CRITICAL REVIEW OF ECONOMETRIC STUDIES
HS-027 438

Turner, David B.
TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

Ulmer, Robert G.
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

Van Der Hoorn, Toon
TRAVEL BEHAVIOR AND THE TOTAL ACTIVITY PATTERN
HS-028 524

Verriest, G.
COLOUR VISION DEFICIENCIES IN ROAD TRAFFIC
HS-027 442

Vollmert, H.
EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

Wakasa, Norio
THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

Wallace, F. J.
EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

Wallace, R. I.
TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM
HS-027 456

Ward, Michael A. V.
EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT
HS-028 527

Watson, N.
HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

Way, R. J. B.
EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

Wehling, Norman W.
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

Welch, Vern E.
THE TRUCK ELECTRONIC GOVERNOR SYSTEM
HS-027 464

Widmayer, Edward
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

Wilkins, Peter A.
THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS--A GENERAL REVIEW
HS-028 394

Williams, D.
VEHICLE NOISE AND THE PASSENGER
HS-027 502

Williams, Earl C.
RUNAWAY TRUCK RAMPS ARE SAVING LIVES AND REDUCING DAMAGE
HS-027 450

Williams, Robert D.
EXPLOSION OF AUTOMOBILE BATTERIES AS A CAUSE OF OCULAR TRAUMA
HS-027 417

Williams, T.
METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

Wingenbach, W.
15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

Winkler, I.
THE INTERPRETATION OF COLLISION SCRATCH MARKS
HS-028 548

Wise, Clare E.
GASOHOL CONSUMPTION SKYROCKETS. TRY A LITTLE "WHITE LIGHTNING" IN YOUR TANK
HS-027 436

Won, Hosik
PERCEPTUAL/COGNITIVE SKILLS AND DRIVING: EFFECTS OF BRAIN DAMAGE
HS-028 396

Woschni, Gerhard
DETERMINATION OF LOCAL HEAT TRANSFER CO-EFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432
EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431
PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

Wren, Genevieve J.
MOTOR TRUCKS OF AMERICA. 1ST ED.
HS-028 520

Wren, James A.
MOTOR TRUCKS OF AMERICA. 1ST ED.
HS-028 520

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Corporate Author Index

Alan M. Voorhees and Associates
FREEWAY TRAFFIC MANAGEMENT. FINAL REPORT
HS-027 473

Alan M. Voorhees and Associates, Operations Div.
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

American National Standards Inst.
STATES' MODEL MOTORIST DATA BASE. DATA ELEMENT DICTIONARY FOR TRAFFIC RECORDS SYSTEMS
HS-805 226

American Public Transit Assoc., 1225 Connecticut Ave., N.W., Suite 200, Washington, D.C. 20036
TRANSIT FACT BOOK. 1978-1979 ED.
HS-028 391

Area Market Res. Associates, First National Bldg., Little Rock, Ark. 72201
ARKANSAS MOTORISTS: OPINIONS AND ATTITUDES ABOUT DRINKING, DRIVING AND ENFORCEMENT OF RELATED LAWS
HS-027 486

Area Market Res. Associates, 2200 First National Bldg., Little Rock, Ark. 72201
ARKANSAS MOTORISTS: THE 55 MPH SPEED LIMIT AND SAFETY DEVICES
HS-027 485

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IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 1. FINAL SUMMARY REPORT
HS-805 270
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 2. FINAL TECHNICAL REPORT
HS-805 271
IDENTIFICATION OF SUPERIOR ENERGY-ABSORBING MATERIALS FOR SCHOOL BUS INTERIORS. VOLUME 3. APPENDICES. FINAL REPORT
HS-805 272

Battelle Columbus Labs., Columbus, Ohio
FATIGUE CRACK INITIATION AND GROWTH ANALYSIS FOR STRUCTURES
HS-027 508

Boeing Vertol Co., P.O. Box 16858, Philadelphia, Pa. 19142
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES (RAIL EQUIPMENT) FOR CRASHWORTHINESS. FINAL REPORT
HS-027 419

Bureau of Consumer Protection, Washington, D.C.
SALE OF USED MOTOR VEHICLES. FINAL STAFF REPORT TO THE FEDERAL TRADE COMMISSION AND PROPOSED TRADE REGULATION RULE (16 CFR PART 455)
HS-027 501

BDM Corp., Dayton, Ohio 45402
AUTOMATIC CAR-FOLLOWING--A STUDY OF POSSIBLE CONTROLLERS
HS-027 454

California Dept. of Motor Vehicles, Sacrament, Calif.
THE EFFECTIVENESS OF ACCREDITED TRAFFIC VIOLATOR SCHOOLS IN REDUCING ACCIDENTS AND VIOLATIONS
HS-028 387

Chevron Res. Co., Richmond, Calif.
AUTOMOTIVE FUELS FOR THE 1980'S
HS-027 519

Combustion Electromagnetics, Inc., 20 Marrett Rd., Lexington, Mass. 02173
EFFECTS OF MICROWAVES ON THE PERFORMANCE OF INTERNAL COMBUSTION ENGINES. FINAL TECHNICAL REPORT
HS-028 527

Comptroller General of the United States, Washington, D.C. 20548
POLICY CONFLICT--ENERGY, ENVIRONMENTAL, AND MATERIALS: AUTOMOTIVE FUEL-ECONOMY STANDARDS' IMPLICATIONS FOR MATERIALS. REPORT TO THE CONGRESS OF THE UNITED STATES
HS-028 516

Congress of the United States, Office of Technology Assessment, Washington, D.C. 20510
GASOHOL. A TECHNICAL MEMORANDUM
HS-027 482

Connecticut State Police Dept., Traffic Div., 294 Colony St., Meriden, Conn. 06450
55 MPH IMPACT PROGRAM EVALUATION. PHASE 1 SUMMARY REPORT
HS-805 213

Daimler-Benz A.G., Federal Republic of Germany
EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

Daimler-Benz A.G., Res. and Devel., Federal Republic of Germany
ADVANCED APPROACHES FOR HEAT TRANSFER CALCULATIONS
HS-027 429

Deere and Co.
DIESEL ENGINE MANUFACTURING IN THE 1980'S
HS-027 517
SELECTING EQUIPMENT FOR FAILURE ANALYSIS
HS-027 513

Department of Transportation
ACTS ADMINISTERED BY THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION. REV. ED., MARCH 1980
HS-805 294

Department of Transportation, Office of the Secretary, Washington, D.C. 20590
ENERGY CONSERVATION POTENTIAL OF OFF-HIGHWAY RECREATIONAL MOTOR VEHICLE. REPORT TO THE CONGRESS
HS-028 392

Department of Transportation, Office of Public and Consumer Affairs, Washington, D.C. 20590
THE U.S. DEPARTMENT OF TRANSPORTATION SURVEYS ON SAFETY BELT USE AND THEIR COMFORT AND CONVENIENCE. FACT SHEET
HS-805 307

Department of Transportation, Washington, D.C. 20590
U.S. DEPARTMENT OF TRANSPORTATION ANNUAL REPORT (NO. 12), FISCAL YEAR 1978
HS-028 542

Det Norske Veritas, Res. Div., Oslo, Norway
STRENGTH ANALYSIS OF THERMALLY LOADED ENGINE COMPONENTS BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL FINITE ELEMENT MODELS
HS-027 425

Dunlap and Associates, Inc., 1 Parkland Dr., Darien, Conn. 06820
A COMPARISON OF ALCOHOL INVOLVEMENT IN PEDESTRIANS AND PEDESTRIAN CASUALTIES. FINAL REPORT
HS-805 249

Elite Electronic Engineering Co., 1516 Centre Circle, Downers Grove, Ill. 60515
PERFORMING SAE (SOCIETY OF AUTOMOTIVE ENGINEERS) J551D RADIO INTERFERENCE TESTING OF AUTOMOTIVE VEHICLES USING THE PROGRAMMED AUTOMATIC SPECTRUM ANALYZER
HS-027 468

Engineering-Science, 7903 Westpark Dr., McLean, Va. 22101
AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

Environmental Div., Washington, D.C. 20590
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

Escher Technology Associates, St. Johns, Mich.
SURVEY OF LIQUID HYDROGEN CONTAINER TECHNIQUES FOR HIGHWAY VEHICLE FUEL SYSTEM APPLICATIONS
HS-028 550

Federal Hwy. Administration
IS DELINEATION NEEDED? (ROADWAY TREATMENTS FOR GUIDING AND ADVISING MOTORISTS)
HS-028 535

Federal Hwy. Administration, Bureau of Motor Carrier Safety, Washington, D.C. 20590
1978 ROADSIDE VEHICLE INSPECTIONS
HS-028 521

Federal Hwy. Administration, Hwy. Statistics Div., Washington, D.C. 20590
A GUIDE TO REPORTING HIGHWAY STATISTICS
HS-027 448

Federal Hwy. Administration, Traffic Systems Div., Washington, D.C. 20590
LABORATORY STUDIES OF LANE OCCUPANCY SIGNS
HS-028 534

Federal Hwy. Administration, Washington, D.C. 20590
MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. 1978 ED.
HS-025 657

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MULTIPROCESSOR SYSTEM FOR DEVELOPING CONTROL STRATEGIES OF CAR ENGINES
HS-027 469

Ford Motor Co., Dearborn, Mich. 48121
FORD/DOE (DEPARTMENT OF ENERGY) SODIUM-SULFUR BATTERY ELECTRIC VEHICLE DEVELOPMENT. PHASE 1-A. FINAL REPORT
HS-028 529

Ford Motor Co., Electrical and Electronics Div., Dearborn, Mich. 48121
THE TRUCK ELECTRONIC GOVERNOR SYSTEM
HS-027 464

Forshungsinstitut der Fraunhofer-Gesellschaft, Laboratorium fur Betriebsfestigkeit, Darmstadt, Federal Republic of Germany
LONG LIFE RANDOM FATIGUE BEHAVIOR OF NOTCHED SPECIMENS IN SERVICE, IN SERVICE DUPLICATION TESTS, AND IN PROGRAM TESTS
HS-028 393

Fruehauf Corp., Res. and Devel. Div.
SOME CONSIDERATIONS IN USING STRAIN-LIFE APPROACH IN FATIGUE DESIGN
HS-027 510

General Accounting Office, Office of the Comptroller General, Washington, D.C. 20548
PUBLIC AND PRIVATE COORDINATION NEEDED IF AUTO REPAIR PROBLEMS ARE TO BE REDUCED. REPORT TO THE SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION AND ITS CONSUMER SUBCOMMITTEE
HS-028 384

General Analysis Inc., 5252 Balboa Ave., San Diego, Calif. 92117
A REVIEW OF NHTSA'S (NATIONAL HWY. TRAFFIC SAFFETY ADMINISTRATION) VEHICLE COMPLIANCE TESTING POLICIES AND PROCEDURES
HS-028 397

General Motors Corp., Transportation Systems Div., 12 Mile and Mound Roads, Warren, Mich. 48090
AUTOMATED CONTROL OF GUIDEWAY TRANSIT VEHICLES
HS-027 457

General Motors Corp., Warren, Mich. 48090
VEHICLE FUEL ECONOMY REVIEW
HS-027 499

Gould Inc., Rolling Meadows, Ill.
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION. ANNUAL REPORT FOR 1978
HS-028 528

Imperial Coll. of Science and Technology, Dept. of Mechanical Engineering, London SW7 2BX, England
HEAT TRANSFER IN THE INDIRECT DIESEL ENGINE
HS-027 430

Institute of Electrical and Electronics Engineers, Inc., 345 East 47th St., New York, N.Y. 10017
IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.) VEHICULAR TECHNOLOGY CONFERENCE (29TH ANNUAL) RECORD OF PAPERS PRESENTED, ARLINGTON HEIGHTS, ILLINOIS, MARCH 27-30, 1979
HS-027 452

Insurance Information Inst., 110 William St., New York, N.Y. 10038
INSURANCE FACTS. 1979 ED.
HS-028 508

Jay Carter Enterprises, P.O. Box 684, Burkburnett, Tex. 76354
15 KWE (NOMINAL) SOLAR THERMAL-ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE RECIPROCATOR SYSTEM. FINAL REPORT
HS-027 484

Jet Propulsion Lab., Pasadena, Calif.
AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

John Deere Product Engineering Center
COMPUTERS IN ENGINE DESIGN
HS-027 518

John Deere Product Engineering Center, Waterloo, Iowa
POST-PROCESSING GRAPHICS FOR BRITTLE FAILURE ANALYSIS
HS-027 514

Johns Hopkins Univ., Dept. of Geography and Environmental Engineering, Baltimore, Md.
MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

JHK and Associates, 4660 Kenmore Ave., Alexandria, Va. 22304
MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

Karl Schmidt G.m.b.H., Federal Republic of Germany
DESIGN AND FATIGUE LIFE EVALUATION OF PISTONS FOR HIGH BMEP (BRAKE MEAN EFFECTIVE PRESSURE) DIESEL ENGINES
HS-027 433

Lamar Instruments, 2107 Artesia Blvd., Redondo Beach, Calif. 90277
MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

Los Alamos Scientific Lab., P.O. Box 1663, Los Alamos, N. Mex. 87544
MICROPROCESSOR-BASED SYSTEM FOR ROLL-DOWN AND ACCELERATION TESTS
HS-027 460

Los Alamos Scientific Lab., P.O. Box 1663, Los Alamos, N. Mex. 87545
DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

Mechanical Technology Inc., Stirling Engine Systems Div., 968 Albany-Shaker Rd., Latham, N.Y. 12110
ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
HS-028 536

Motor Vehicle Manufacturers Assoc. of the U.S., Inc., 300 New Center Bldg., Detroit, Mich. 48202
MOTOR TRUCKS OF AMERICA. 1ST ED.
HS-028 520

MAHLE G.m.b.H., Federal Republic of Germany
INVESTIGATIONS OF ENGINE COMPONENTS BY MEANS OF PHOTOELASTICITY
HS-027 435

MGA Res. Corp.
AN ANALYTICAL STUDY OF ELECTRIC VEHICLE HANDLING DYNAMICS
HS-028 537

National Aeronautics and Space Administration, Lewis Res. Center, Cleveland, Ohio 44135
STIRLING ENGINES FOR AUTOMOBILES
HS-028 386

National Bureau of Standards, Environmental Design Res. Div., Washington, D.C. 20234
EVALUATION OF SAFETY SYMBOLS
HS-027 414

National Com. on Uniform Traffic Laws and Ordinances, Suite 430, 1776 Massachusetts Ave., N.W., Washington, D.C. 20036
RULES OF THE ROAD RATED
HS-805 225

National Hwy. Safety Advisory Com., Washington, D.C. 20591
HIGHWAY SAFETY DATA. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 788

COMMERCIAL VEHICLE MAINTENANCE AND SAFETY INSPECTION PROGRAMS. A REPORT TO THE SECRETARY OF TRANSPORTATION BY THE NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE
HS-804 789

National Hwy. Traffic Safety Administration
MOTORCYCLE OPERATOR LICENSING. ISSUE PAPER
HS-805 255

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PROPOSED AMENDMENTS TO TITLE V OF THE MOTOR VEHICLE INFORMATION AND COST SAVINGS ACT. STATEMENT BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER, HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, MARCH 28, 1980
HS-810 370

National Hwy. Traffic Safety Administration, Office of Program and Rulemaking Analysis
FINAL REGULATORY ANALYSIS OF THE MODEL YEAR 1982 LIGHT TRUCK FUEL ECONOMY STANDARDS
HS-805 291

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
CHILD RESTRAINT USAGE. ISSUE PAPER. REV. ED.
HS-803 819

GENERAL SAFETY BELT USAGE. ISSUE PAPER. REV. ED.
HS-803 824

ALCOHOL & HIGHWAY SAFETY LAWS: A NATIONAL OVERVIEW
HS-805 173

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
THE CAR BOOK: A CONSUMER'S GUIDE TO CAR BUYING
HS-805 580

VEHICLE SAFETY IN THE WORLD CAR MARKETPLACE. REMARKS BEFORE THE WORLD MOTOR INDUSTRY CONFERENCE, GENEVA, SWITZERLAND, MARCH 3, 1980
HS-810 367

REMARKS BEFORE THE NATIONAL ASSOCIATION OF FLEET ADMINISTRATORS, NEW ORLEANS, MARCH 10, 1980
HS-810 368

REMARKS AT THE SPRING MEETING OF THE D.C. CHAPTER OF THE AMERICAN ACADEMY OF PEDIATRICS, WASHINGTON, D.C., MARCH 25, 1980
HS-810 369

National Police Agency, Traffic Bureau, Japan
STATISTICS '78 OF ROAD TRAFFIC ACCIDENTS IN JAPAN
HS-027 472

National Transportation Safety Board, Bureau of Accident Investigation, Washington, D.C. 20594
HIGHWAY ACCIDENT REPORT. MULTIPLE-VEHICLE COLLISION IN A CONSTRUCTION ZONE, U.S. INTERSTATE 80, NEAR LARAMIE, WYOMING, AUGUST 22, 1979
HS-028 540

National Transportation Safety Board, Washington, D.C. 20594
NATIONAL TRANSPORTATION SAFETY BOARD. ANNUAL REPORT TO CONGRESS, 1979
HS-028 541

New York State Dept. of Transportation, Albany, N.Y.
FOREIGN OIL DEPENDENCE: STATE-LEVEL ANALYSIS (NEW YORK)
HS-028 513

Niigata Engineering Co., Ltd., Engineering Center, Tokyo, Japan
THE PERFORMANCE OF NTS (NIIGATA NEW TRANSPORTATION SYSTEM) VEHICLE STEERING CONTROL SYSTEM. A STUDY
HS-027 453

Nippon Telegraph and Telephone Public Corp., Engineering Bureau, Japan
HIGH CAPACITY AUTOMOBILE TELEPHONE SYSTEM
HS-027 462

Norwegian Inst. of Tech., Div. of Combustion Engines and Marine Engineering, Trondheim, Norway
SURVEY OF THEORETICAL AND EXPERIMENTAL EVALUATION OF THERMAL LOADING OF DIESEL ENGINES IN NORWAY
HS-027 424

Oak Ridge National Lab., Oak Ridge, Tenn.
MULTIVARIATE CLASSIFICATION OF AUTOMOBILES BY USE OF AN AUTOMOBILE CHARACTERISTICS DATA BASE
HS-028 515

Oak Ridge National Lab., Oak Ridge, Tenn. 37830
AN INVESTIGATION OF THE VARIABILITY OF GASOLINE CONSUMPTION AMONG STATES
HS-027 440

ENERGY INTENSITY AND RELATED PARAMETERS OF SELECTED TRANSPORTATION MODES: PASSENGER MOVEMENTS
HS-027 441

Ohio State Univ., Dept. of Electrical Engineering, 2015 Neil Ave., Columbus, Ohio 43210
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

Peat Marwick and Partners
DRIVER EDUCATION EVALUATION TESTS. SUMMARY REPORT
HS-028 380

Peat, Marwick, Mitchell and Co., 1025 Connecticut Ave., N.W., Washington, D.C. 20036
AIR QUALITY IMPACTS OF TRANSIT IMPROVEMENT, PREFERENTIAL LANE, AND CARPOOL/VANPOOL PROGRAMS. FINAL REPORT
HS-027 415

Peat, Marwick, Mitchell and Co., 1990 K St., N.W., Washington, D.C. 20006
MEASURES OF EFFECTIVENESS FOR MULTIMODAL URBAN TRAFFIC MANAGEMENT. VOL. 2: DEVELOPMENT AND EVALUATION OF TSM (TRANSPORTATION SYSTEMS MANAGEMENT) STRATEGIES. FINAL REPORT
HS-028 538

Prime Minister's Office, Japan
JAPANESE GOVERNMENT WHITE PAPER ON TRANSPORTATION SAFETY. 1979 ED.
HS-027 471

Princeton Univ., Princeton, N.J.
APPROACH TO ASSESSING THE IMPACT OF ENERGY CONSERVATION POLICIES ON TRANSPORTATION DEMAND
HS-028 511

Research and Special Programs Administration, Transportation Systems Center, Cambridge, Mass.
VEHICLE KILOMETERS TRAVELED: EVALUATION OF EXISTING DATA SOURCES
HS-028 514

Robert Bosch G.m.b.H., Stuttgart, Germany
ELECTRONIC CONTROL UNIT FOR PASSENGER CAR ANTISKID
HS-027 458

Robert F. McAlevy 3rd. and Associates, 1204 Bloomfield St., Hoboken, N.J. 07030
THE IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
HS-028 549

Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pa. 15096
DIESEL ENGINE THERMAL LOADING
HS-027 423

FATIGUE RESISTANCE TESTING AND FORECASTING
HS-027 507

ENGINE TECHNOLOGY FOR THE 1980'S. ENGINEERING KNOW-HOW IN ENGINE DESIGN, PT. 27
HS-027 515

Sundstrand Advanced Technology Group, 4747 Harrison Ave., Rockford, Ill. 61101
15 KWE (NOMINAL) SOLAR THERMAL ELECTRIC POWER CONVERSION CONCEPT DEFINITION STUDY--STEAM RANKINE TURBINE SYSTEM. FINAL REPORT
HS-027 483

SRI International, Menlo Park, Calif. 94025
IGNITION NOISE OF FOREIGN AND DOMESTIC VEHICLES IN USE IN THE UNITED STATES
HS-027 467

Technische Universitat Carolo-Wilhelmina, Lehrstuhl und Institut fur Verkehrswesen, Braunschweig, West Germany
AN ACCIDENT-SEVERITY ANALYSIS FOR A UNIFORM-SPACING HEADWAY POLICY
HS-027 463

Technische Universitat Munchen, Munich, Federal Republic of Germany
PREDICTION OF THERMAL LOADING OF SUPERCHARGED DIESEL ENGINES
HS-027 426

EXPERIMENTAL INVESTIGATION OF THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF A HIGH SPEED DIESEL ENGINE
HS-027 431

DETERMINATION OF LOCAL HEAT TRANSFER COEFFICIENTS AT THE PISTON OF A HIGH SPEED DIESEL ENGINE BY EVALUATION OF MEASURED TEMPERATURE DISTRIBUTION
HS-027 432

Texas A and M Univ., Texas Transportation Inst., College Station, Tex. 77843
DEVELOPMENT OF A WET WEATHER SAFETY INDEX. FINAL REPORT (HIGHWAY ACCIDENT PREDICTION AND REDUCTION)
HS-027 491

Toshiba Corp., Toshiba Komukai Works, Kawasaki, Japan
MICROWAVE AUTOMATIC VEHICLE IDENTIFICATION (AVI) SYSTEM
HS-027 459

Transducer Systems, Inc., Willow Grove, Pa. 19090
HIGH QUANTITY, LOW COST, HIGH ENVIRONMENT AUTOMOTIVE TRANSDUCERS, A NEW BREED FOR USE IN ADVANCED AUTOMOTIVE ELECTRONIC SYSTEMS
HS-027 461

Transport and Road Res. Lab., Accident Investigation Div., Crowthorne, Berks., England
"TOWN BEAMS" FOR VEHICLES--EXPERIENCE WITH AN AUTOMATIC HEADLAMP DIMMING SYSTEM
HS-027 490

Transport and Road Res. Lab., Traffic Systems Div., Crowthorne, Berks., England
M6 RECONSTRUCTION 1976: TWO-WAY TRAFFIC USING NARROW LANES (STAFFORDSHIRE, ENGLAND)
HS-027 488

ALTERNATIVE PRIORITY MARKINGS FOR SAFETY AT SUBURBAN T-JUNCTIONS
HS-027 489

Transport and Road Res. Lab., Transport Engineering Div., Crowthorne, Berks., England
METHODS OF EVALUATING THE EFFECT OF AERODYNAMICS ON THE FUEL CONSUMPTION OF COMMERCIAL VEHICLES
HS-027 487

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CONSPICUITY. HOW TO SURVIVE THE "I DIDN'T SEE HIM" SYNDROME (MOTORCYCLIST VISIBILITY)
HS-027 498

Transportation Res. Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418
ENERGY POLICY IMPACT EVALUATION
HS-028 510

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DETERMINATION OF VEHICLE ROLLING RESISTANCE AND AERODYNAMIC DRAG
HS-027 465

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EFFECT OF PARTIAL SUPPRESSION OF HEAT LOSS TO COOLANT ON THE HIGH OUTPUT DIESEL ENGINE CYCLE
HS-027 427

RESULTS OF MATCHING CALCULATIONS FOR TURBOCHARGED AND COMPOUND ENGINES WITH REDUCED HEAT LOSS
HS-027 428

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HS-028 512

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TESTING A PROTOTYPE INDUCTIVE POWER COUPLING FOR AN ELECTRIC HIGHWAY SYSTEM

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AN APPLICATION OF EQUATION ERROR IDENTIFICATION TECHNIQUES TO THE PROBLEM OF VEHICULAR DRAG PARAMETER DETERMINATION

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PROACH USING IMPACT ANALYSIS

HS-028 3

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Tenn. 37916**

THE USE OF CHILD PASSENGER SAFETY DEVIC
IN TENNESSEE

HS-027 4

Utah Dept. of Public Safety, Hwy. Safety Div.

MOTORCYCLE ACCIDENT INVESTIGATION 197
1976, 1977, 1978. A FOUR YEAR ANALYSIS OF M
TORCYCLE SAFETY IN UTAH

HS-028 3

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ANALYSIS AND EXPERIMENT

HS-027 4

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WAY VEHICLES

HS-027 4

Contract Number Index

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HS-805 225

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HS-805 266

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HS-027 491

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Report Number Index

AER-1713	HS-027 483
ANL/OEPM-78-11	HS-028 528
ANSI-D-20.1-1979	HS-805 226
ANSI-D6.1-1978	HS-025 657
CAL-DMV-RSS-79-71	HS-028 387
CR-7905	HS-028 380
DOE-SAN-1865-T1	HS-028 527
DOE/CS/2566-1	HS-028 529
DOE/JPL/955312-T1	HS-028 537
DOE/NASA/0032-79/4	HS-028 536
DOE/NASA/0061-79/1	HS-027 483
DOE/NASA/0063-79/1	HS-027 484
DOE/NASA/1040-79/7	HS-028 386
DOT-I-79-22	HS-028 539
DOT-TSC-FRA-79-13	HS-027 419
E-116	HS-028 386
ED79-11	HS-805 249
EPA-400/2-78-002	HS-027 415
FCP-23	HS-027 511
FHWA-RD-79-113	HS-028 538
FHWATX77-2211F	HS-027 491
FRA/ORD-79-13	HS-027 419
GAO-EMD-80-22	HS-028 516
GM-4GFS/0607/1	HS-027 499
HCP/M2752-01	HS-028 550
HRD-80-30	HS-028 384
ICAF-1094	HS-028 393
IEEE-79CH1378-9VT	HS-027 452
ISVR-TR-100	HS-028 395
ISVR-TR-98	HS-028 394
ITS-Working-Paper-110	HS-028 518
MTI-79ASE77RE2	HS-028 536
NASA-CR-159589	HS-027 483
NASA-CR-159591	HS-027 484
NASA-CR-159631	HS-028 536
NASA-TM-79222	HS-028 386
NBSIR-79-1760	HS-027 414
NTSB-HAR-80-1	HS-028 540
N79-33497	HS-028 393
ORNL-5391	HS-027 440
ORNL-5506	HS-027 441
OTA-TM-E-1	HS-027 482
PB-282 346	HS-027 415
PB-292 064	HS-804 789
PB-298 175	HS-027 414
PB80-103 237	HS-028 539
PB80-198682	HS-028 538
SAE-SP-446	HS-027 515

SAE-SP-448 HS-027 507
SAE-SP-449 HS-027 423
SAE-790511 HS-027 508
SAE-790513 HS-027 509
SAE-790807 HS-027 516
SAE-790808 HS-027 517
SAE-790809 HS-027 519
SAE-790810 HS-027 518
SAE-790819 HS-027 424
SAE-790820 HS-027 425
SAE-790821 HS-027 426
SAE-790823 HS-027 427
SAE-790824 HS-027 428
SAE-790825 HS-027 429
SAE-790826 HS-027 430
SAE-790833 HS-027 431
SAE-790834 HS-027 432
SAE-790857 HS-027 433
SAE-790858 HS-027 434
SAE-790859 HS-027 435
SAE-790889 HS-027 510
SAE-790890 HS-027 511
SAE-790892 HS-027 512
SAE-790893 HS-027 513
SAE-790894 HS-027 514
TC-78-019 HS-027 474
TP-1604 HS-027 498
TP-2467 HS-028 380
TRR-726 HS-028 510
TRRL-LR-880 HS-027 490
TRRL-SR-472 HS-027 489
TRRL-SR-474 HS-027 488
TRRL-SR-481 HS-027 487
TTI-RR-221-1F HS-027 491
UCRL-52758 HS-028 549
UM-HSRI-79-92 HS-028 517
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